

Food Technology Abstracts



Central Food Technological Research Institute, Mysore.

National Information System for Science and Technology
Department of Scientific and Industrial Research, New Delhi.

NICFOS

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The National Information Centre for Food Science and Technology (NICFOS), is a discipline oriented information service in Food Science, Technology and Nutrition. Set up in October 1977 at the Central Food Technological Research Institute (CFTRI), Mysore, it is one of the Sectoral Information Centres under the NISSAT of the Govt. of India, Dept. of Scientific and industrial Research.

NICFOS's services are generated by a band of professional specialists and backed up by reprographic, micrographic, printing and computer facility. Its services include publication of R & D and industry oriented current awareness services, answering technical inquiries, reprography and training.

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FOSTIS, CFTRI,

Mysore 570 013,

Karnataka, India.

FOOD TECHNOLOGY Abstracts

Vol. 27 No. 3 March 1992



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NATIONAL INFORMATION CENTRE FOR FOOD SCIENCE AND TECHNOLOGY

CFTRI, MYSORE - 570 013

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FOOD TECHNOLOGY ABSTRACTS

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National Information Centre For Food Science And Technology
Central Food Technological Research Institute,
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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm ² , cm ³]
cal	calorie
cd	candela
Cl	curl
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detrn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10 ⁻¹⁵ , as in (Ci)]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
f oz	fluid ounce
f.p.	freezing point
ft	foot, feet

g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10 ⁻⁹ , as in nm]
N	Newton [kg m/s ²]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10 ⁻¹² , as in pCi]
P	poise
P	probability
Pa	Pascal [N/m ²]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PVFE	polytetrafluoroethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride

qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp., spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to;
	not less than
<	less than
≤	less than or equal to;
	not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

485

Naik Kurdade (AG). Processed fruits and vegetables - India can be on the world map soon. *ISI Bulletin* 4(10); 1991; 409-410

The author gives a brief scenario of the fruit and vegetable processing industry in India and points out the constraints and suggests to improve the quality of the products through standardisation which will improve the domestic consumption and export market. SRA

486

Shashi Sareen. Formulation of standards on convenience foods. *ISI Bulletin* 4(10); 1991; 411-413, 424

Convenience food industry in India has grown, of late at a rapid rate indicating the need for standardisation in the industry. Indian convenience foods have been classified as snacks, ready mixes and instant foods and a brief mention is made about where standards have been formulated. The parameters to be considered with standardisation are quality of raw materials, hygienic conditions at the preparation site, limits to be prescribed for different parameters, and also standardisation on nutritional, packaging and labelling requirements. The problems faced during the formulation of standards for snack foods have been briefly described. SRA

FOOD PROCESSING

NII

FOOD PACKAGING

487

Anon. Packaging - the new horizon. *Packaging India* 23(5); 1990; 19, 21

Aspects covered in this article include: flexible pouches, Brick style/Gable top cartons, bag-in-box, collapsible laminated tubes, rigid plastic container and hazards of packaging production. CSA

488

Anon. Role of packaging in '90's. New horizon. *Packaging India* 23(5); 1990; 27-30

489

Shrinivas Digho. Surface design in food packaging. *Packaging India* 23(5); 1990; 31-33

490

Ishida (O). Overview on Asean food processing and packaging. *Packaging Japan* 12(61); 1991; 65-70

This article provides an overview of 6 Asean food processing and packaging countries. They include Singapore (growth of prepackaged foods, governmental support, food retail, machinery market); Thailand (packaging materials and machines); Brunei (promising agro-business, future); Indonesia (food processing and packaging, machinery market); Malaysia (growth potential, machines and materials); Philippines (food processing and packaging). CSA

491

Shibauchi (Y) and Hatanaka (K). Sterilization of packaging containers with gasified hydrogen peroxide. *Packaging Japan* 12(62); 1991; 65-69

The sterilizing method of molded containers by using hydrogen peroxide gas and its practical application are discussed. This article deals with the development of the hydrogen peroxide vaporizer-vaporizing characteristics of hydrogen peroxide decomposition rate of hydrogen peroxide, necessary conditions for designing a vaporizer; elimination of hydrogen peroxide from the surface of packaging materials sterilized; transmittance of UV rays within hydrogen peroxide - absorption of UV rays by hydrogen peroxide, effect of the joint use of hydrogen peroxide gas and UV rays; sterilization. Results indicate hydrogen peroxide gas possessed the effective sterilizing effect and it presented a sort of synergistic effect when it was combined with UV rays. Considering the fact that even low-concn. of hydrogen peroxide gas is effective in sterilization when UV rays are used together, the combined method may be effective and efficient in the practical application. CSA

492

Hishinuma (K). Development of technologies on control for "powder dancing" and "liquid dripping" in the packaging process. *Packaging Japan* 12(62); 1991; 74-79

Packaging materials

493

Anon. **Future trend in heat resistant processing materials and containers. From exclusive-use types to double-use type.** *Packaging Japan* 12(61): 1991: 46-47

This article discusses the heat resistant packaging materials and containers and the microwavable food market - national brand market, store brand market and the new microwavable packaged foods newly introduced. CSA

FOOD ENGINEERING AND EQUIPMENT

494

Sastry (SK) and Palaniappan (S). **The temperature difference between a microorganism and a liquid medium during microwave heating.** *Journal of Food Processing Preservation* 15(3): 1991: 225-230

Results of the analysis using heat transfer principles showed that because of the microscopic size of bacteria, the surface area to volume ratios of organisms were extremely high causing heat loss to the environment. So the microorganisms required to possess extremely high dielectric loss factors to maintain even small temp. differences. The energy adsorption difference for 1 C difference between microorganism and medium for a range of conditions was shown. SD

495

Watanabe (H) and Sakai (Y). **A one-dimensional stress pulse propagation model for cryo-comminution of agglomerated granules into individual granules.** *Journal of Food Process Engineering* 14(1): 1991: 9-19

An elementary theory of stress pulse propagation was applied to a one-dimensional mathematical model for cryo-comminution of agglomerated granules into individual granules. An assembly of granules is approximated by a bar constructed with blocks stuck together. When an impulsive loading is given at one end of the bar, a compressive stress pulse generates there and propagates through the bar. When it survives after transmitting through the interfaces between blocks and reaches the opposite free end, the compressive stress pulse turns into a tensile stress. This tensile stress causes separation of the block located farthest away from the loading end, provided the intensity of the stress pulse exceeds the tensile strength of the material. The

model successfully explained the experiment on shattering orange juice ice as well as frozen citrus fruit. AS

496

Owusu-Ansah (YJ). **Advances in microwave drying of foods and food ingredients.** *Canadian Institute of Food Science and Technology Journal* 24(3/4): 1991: 102-107

The use of microwaves in various food dehydration applications is reviewed. The microwave drying equipment (booster dryer, vacuum dryer and freeze dryers); the economics of microwave drying and its potential applications in the food industry are discussed. 10 references. GS

Equipment

497

Haque (E). **Application of size reduction theory to roller mill design and operation.** *Cereal Foods World* 36(4): 1991: 368-375

This feature article describes the principle on which compression or nipping type machine, impact or blow type machine, shearing or cutting type machine, and attrition type machine functions. The author also discusses the various factors affecting the roller mill performance. BV

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

498

Su (C-H) and Yang (C-P). **Partial removal of various food components from aqueous solution using crosslinked polymers of cyclodextrins and epichlorohydrin.** *Journal of the Science of Food and Agriculture* 54(4): 1991: 635-643

Polymer gels prepared by polymerising cyclodextrin, its derivatives and dextrin with epichlorohydrin were studied for effect in removing natural food components-naringin, caffeine and theobromine from aqueous solution. The capacity of the gel to remove natural products was highest for naringin, intermediate for vanillin, and lowest for caffeine and theobromine. Aqueous sodium hydroxide (0.5 M) effectively regenerated a β CD-ECH gel for repeated binding of naringin. About 97% of relative removal

efficiency was retained after 7 regenerations in batch operation. A column procedure was also effective for naringin removal. BV

499

Wedzicha (BL) and Goddard (SJ). **The state of sulphur dioxide at high concentration and low water activity.** *Food Chemistry* 40(2): 1991: 119-136

The pK of sulphurous acid is reduced by salts (NaCl, NaNO₃) causing greater concn. and increasing the nucleophilic reactivity of the preservative. Nonelectrolytes have either no effect (e.g. sucrose) or tend to increase pK (e.g. ethanol, glycerol and PEG-400). Water activity found in dehydrated/partially dehydrated foods is not the variable which determines the pK values in presence of nonelectrolytes. The effects of electrolytes and nonelectrolytes on the pK of sulphurous acid are relevant to acid foods containing preservatives. With ethanol there is a tendency for the solute to encourage formation at a given pH of larger amounts of sulphurous acid than expected from existing pK values in water and increase antimicrobial activity of the preservative by increasing the concn. of the active constituent. SD

500

Pruthi (JS). **Development of simple and effective techniques for identification of irradiated foods - A resume.** *Beverage and Food World* 17(1): 1990: 17-18

This article considers essential pre-requirements of the desired test, criteria for a quantitative test, techniques studied: electron spin resonance technique, thermoluminescence technique, radiation modified DNA technique, lipid radiolysis products technique, carbohydrate and protein radiolytic products and modified limulus lysate method. SRA

Chemistry

501

Hong (YC), Koelsch (CM) and Labuza (TP). **Using the L number to predict the efficacy of moisture barrier properties of edible food coating materials.** *Journal of Food Processing Preservation* 15(1): 1991: 45-62

A computer model developed indicated that when the L number, the ratio of the moisture permeance of a food substance to that of a coating material, is smaller the 0.04, the main resistance to moisture transfer for a coated food material is the diffusion of moisture within the food material itself and is larger

than 4, the main resistance to moisture transfer is the permeance of the coating material which was adopted to predict the effectiveness of different coating materials for dried foods. SD

502

Hoyland (DV) and Taylor (AJ). **A review of the methodology of the 2-thiobarbituric acid test.** *Food Chemistry* 40(3): 1991: 271-291

Aspects covered include history and chemistry of the thiobarbituric acid (TBA) test, TBA test procedures, interference in the TBA test, modifications to the TBA test, standardisation and recovery from TBA tests, limitations of the TBA test, correlation of TBA test with chemical and sensory analysis and other TBA procedures. 121 references. SD

Chemistry(Analytical)

503

Dhingra (PK). **Food analysis - need and objectives.** *ISI Bulletin* 4(10): 1991: 408, 410

The author briefly describes the purpose of food analysis and methods available. The standard methods available both nationally and internationally, the method of sampling before analysis, and the criteria applied before selecting the appropriate test method and the probable sources of error have been explained. SRA

504

Speck (A.J), Speck-Salchun (S) and Schreurs (WHP). **Determination of macronutrient and micronutrient levels in Thai foods. An evaluation of the Thai food composition table.** *Food Chemistry* 40(3): 1991: 251-262

505

Sarrade (S), Rios (GM), Autret (JM) and Takerkart (G). **Tentative analysis of gelatin ultrafiltration by gel permeation chromatography.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 23-28 (Fr)

In this paper, various permeate and retentate samples taken at different times during the ultrafiltration of a gelatin solution on a new ruthenium-titane oxide membrane coated onto an alumina support have been analysed using the gel permeation chromatography (GPC) technique. It is shown how the use of this fairly sophisticated method, coupled with the more traditional approach (consisting of a continuous recording of permeate flow rate and total nitrogen rejection rate) allow a better insight into the basic mechanisms that control membrane fouling and the effect of it on

performance. For the particular system investigated, it is clearly apparent that as long as the ruthenium-titane oxide membrane effectively controls the separation, cake filtration mechanisms prevail. But, when the effects of the alumina support become pre-eminent, deep filtration mechanisms substitute for them. AS

506

Endress (H-U), Omran (H) and Gierschner (K). **Monitoring the course of enzymatic degradation of pectic substances by automated fast ion chromatography (FIC).** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 80-85

The enzymic degradation of pectic substances and the separation and detection of the reaction products were monitored using modern, quick and accurate methods (6). It was possible to follow the degradation process of the pectic substances, using commercial pectic enzyme preparations. The results show that oligogalacturonic acids with DP = 2 - 6 were degraded to the monomer when using Pectinex Ultra SPL without any inhibition by the end products. The existence of an exo-oligogalacturonase in the commercial pectic enzyme preparation used could therefore be confirmed. During the degradation of Na-polygalacturonate, oligomers with DP = 8 - 9 predominated in the early phase of treatment. It can therefore be said that the endo-polygalacturonase (or pectate lyase) in the commercial enzymes used preferred to attack the substrate in positions that allow oligomers with DP = 8 - 9 to be split or, that the substrate used did not contain a homogenous galacturonide chain longer than 9 units. Further degradation of the unsaturated tri-galacturonic acid released through the enzyme activities of Pectinex Ultra SPL was not observed. It is probable that pectate lyase (PAL) is present in the commercial enzyme preparation and subsequently in the fungi media. High oligomers were not detected during the enzymic treatment of highly methoxylated pectin. AS

507

Garcia (MS), Sanchez-Pedreno (C), Alberio (MI) and Sanchez (C). **Kinetic determination of iodide in pharmaceutical and food samples.** *Analyst* (London) 116(6): 1991: 653-656

A kinetic method for the detn. of iodide based on its inhibitory effect on the Pd²⁺ catalysed reaction between ethylenediaminetetraacetic acid (EDTA-Co²⁺) and the hypophosphite ion is described. The reaction was followed spectrophotometrically by measuring the decrease in the absorbance at 540 nm. Under the optimum experimental conditions of $2.6 \times 10^{-3} \text{ mol dm}^{-3} \text{ Co}^{2+}$ -EDTA, $0.4 \text{ mol dm}^{-3} \text{ H}_2\text{PO}_2^-$,

pH 3.2 (adjusted with Britton-Robinson buffer), $0.57 \text{ MUg ml}^{-1} \text{ Pd}^{2+}$ and 20 plus or minus 0.2 C, iodide was determined in the range 2 - 28 ng ml⁻¹. The method was applied to the detn. of iodide in pharmaceutical products, iodinated salts, cow's milk and infants' powdered milk. AS

508

Grob (K), Lanfranchi (M), Egli (J) and Artho (A). **Determination of food contamination by mineral oil from jute sacks using coupled LC-GC.** *Journal of the Association of Official Analytical Chemists* 74(3): 1991: 506-512

Foods transported or stored in jute bags are contaminated by batching oil (mineral oil). An automated on-line LC-GC method is described for determining the hydrocarbons in foods (nuts, coffee, cocoa products and rice contamination ranged between 5 and 500 p.p.m. BV

FOOD MICROBIOLOGY AND HYGIENE

509

Al-Dagal (M) and Fung (DYC). **Aeromicrobiology - A review.** *CRC Critical Reviews in Food Science and Nutrition* 29(5): 1990: 333-340

This article reviews the presence of microorganisms in air and their sources, the relation of airborne dust and endotoxin, the sources of atm. microbial contamination in food processing plants, the mechanisms of airborne particle deposition, the importance of airborne microbes, the survival of microorganisms in air, methods of air sampling, airborne microbial populations in food-processing plants, control of airborne microorganisms in food-processing plants, and the general issue of microorganisms in air and their impact on food safety. 78 references. BV

Enzymes

510

Roch-Chui Yu and Hang (YD). **Purification and characterisation of a glucoamylase from *Rhizopus oryzae*.** *Food Chemistry* 40(3): 1991: 301-308

Glucoamylase (EC 3.2.1.3) of *Rhizopus oryzae* NRRL 395 was sevenfold purified by sequential ammonium sulphate fractionation, Bio Gel P-100 gel filtration, Q-sepharose anion exchange and S-sepharose cation exchange and the following results were observed: pH 4.8, temp. 60 C, mol. wt. 67000 daltons, pI 8.7, K_m for amylopectin 0.98, soluble starch 1.34 mg/ml, V_m for amylopectin 782,

soluble starch 136 MU moles of glucose produced/mg of protein/min. The enzyme activity was inhibited by Hg^{2+} , Pb^{2+} and Cd^{2+} , but not by EDTA. SD

Microorganisms

511

Manninen (MT), Fung (DYC) and Hart (RA). **Spiral system and laser colony scanner for enumeration of microorganisms.** *Journal of Food Safety* 11(3): 1991; 177-187

Aerobic Plate Count (APC) and spiral plate (Spiral) methods using both manual counting (MC) and laser counting (LC) procedures were compared for pure bacterial, yeast, and mold cultures and raw milk samples. All four combinations of methods (APC-MC, APC-LC, Spiral-MC, and Spiral-LC) gave similar $\log_{10}$ counts of studied pure microbial cultures, producing results that were not different for the purposes of practical microbiology. With bacterial and yeast cultures, counts differed by less than half a logarithmic cycle (the range of difference = -0.26 to +0.42), the range of difference being -0.03 to +0.62 for *Aspergillus flavus* and *Penicillium camemberti* molds. An exception was noticed with *Rhizopus oligosporus* mold plates were read by laser due to large (10 - 15 mm) colony size. The difference between the readings made manually and by laser colony scanner was about one logarithmic cycle with both APC and Spiral methods. Statistical analyses of the manually read results of bacterial and *Saccharomyces cerevisiae* spiral plates showed no differences at the 0.05 level of significance between the readings made by 4 or 5 persons. For raw milk samples, Spiral-MC and Spiral-LC methods gave higher microbial numbers than APC-MC (63% of samples) and APC-LC (54% of samples) at 0.05 level of significance ($p < 0.001$). Of the LC results, 75% were within a plus or minus 0.5 logarithmic cycle range when compared to MC results, of which 98% were within the same range. All results were still within a plus or minus 1.0 logarithmic range. When APC and Spiral for raw milk samples were analyzed, LC gave higher microbial numbers compared to MC: 71% of the APC-LC results were higher than APC-MC results, and 85% of Spiral-LC results were higher than Spiral-MC results at 0.05 level of significance ($p < 0.001$). 77% of the results by either plating technique were within a plus or minus 0.5 logarithmic range. AS

Algae

512

Horie (Y), Sugase (K) and Horie (K). **Dietary fibre in brown algae and mushrooms.** *ASEAN Food Journal* 6(1): 1991; 32-33

Bacteria

Escherichia coli

513

Singleton (ER), Hamdy (MK), McCay (SQ) and Zaparka (FA). **Detection of fimbriae (CFA/I) on enterotoxigenic *Escherichia coli* using antibodies.** *Journal of Food Safety* 11(3): 1991; 215-225

Fimbriae (CFA/I) were isolated after detachment from an enterotoxigenic *Escherichia coli* (ETEC) strain H10407, purified by successive isoelectric point precipitation at pH 3.5, and injected into rabbits. The antisera containing the polyclonal antibodies against the fimbrial proteins (antigens) were then used to detect the presence of CFA/I on other *E. coli* cultures using an indirect ELISA system. The ELISA procedures for the CFA/I assay was as sensitive as the DNA hybridization for detecting the ETEC strains. Two bands (major and minor) were present when the isolated fimbrial proteins were subjected to SDS-PAGE. The major band had a mol. mass of 40.3 and the minor 36.4 kDa. Electron microscopy of the fimbriae appeared as thin thread rods with variable length (5 - 15 μm). AS

Listeria

Listeria monocytogenes

514

Yu (LSL) and Fung (DYC). **Oxyrase enzyme and motility enrichment Fung-Yu tube for rapid detection of *Listeria monocytogenes* and *Listeria* species.** *Journal of Food Safety* 11(3): 1991; 149-162

A rapid and simple method using a U-shaped glass apparatus (Fung-Yu tube) for early detn. of the presence of *Listeria monocytogenes* and *Listeria* species in mixed cultures and inoculated meat samples has been developed. This system utilizes unique biochemical and physical properties of *Listeria* for selective enrichment. Fraser broth was used as a selective enrichment broth especially for observation of esculin hydrolysis (blackening of broth), and semisolid Modified Oxford agar was used for selective detection of motility of *Listeria*. When Fung-Yu tubes containing 0.1 unit/mL of OxyraseTM (membrane fractions of *Escherichia coli*) were inoculated with *L. monocytogenes*, an enhanced early growth of *L. monocytogenes* occurred. A presumptive positive result for low numbers of *L. monocytogenes* (1 - 100 CFU/g) in the presence of

large numbers of competitive microflora in pre-enriched (24 h) ground beef samples using the Fung-Yu tube method with the aid of OxyraseTM was obtainable within 10 h. Using this system, isolation of *Listeria* in the presence of mixed bacterial flora (44 species), such as *Bacillus*, *Escherichia*, *Klebsiella*, *Proteus*, *Salmonella*, *Shigella*, *Staphylococcus*, and *Streptococcus*, and in inoculated ground beef was successful in 24 - 48 h. The Fung-Yu tube procedure is a highly sensitive, selective, and easy-to-use method to separate and isolate *L. monocytogenes* and other *Listeria* spp. from other contaminating microorganisms in meats. AS

515

Yu (LSL) and Fung (DYC). **Effect of oxyrase enzyme on *Listeria monocytogenes* and other facultative anaerobes.** *Journal of Food Safety* 11(3): 1991: 163-175

The use of an oxygen-reducing membrane fraction to stimulate growth of some anaerobic bacteria has been reported. In this study, stimulated recovery of *Escherichia coli* 0157:H7, *Salmonella typhimurium*, *Streptococcus faecalis*, and heat injured *Listeria monocytogenes* was achieved by using broth media supplemented with OxyraseTM (membrane-bound enzyme system derived from *E. coli*). The OxyraseTM enzyme allowed rapid growth of these facultatively anaerobic organisms in a nonselective broth. The activity of OxyraseTM in four different selective enrichment broths to support growth of *L. monocytogenes* also was evaluated. Among tested broths, FDA-approved *Listeria* Enrichment Broth containing OxyraseTM was found to be substantially superior for facilitating the growth of *L. monocytogenes*. OxyraseTM promoted a significantly greater number of *L. monocytogenes* than commonly used but nonspecific reducing agents, such as L-cysteine HCl and sodium thioglycolate. These findings indicated that all organisms tested can be grown well in liquid media using the oxygen consuming membrane fragments to achieve and maintain oxygen-limited conditions. The OxyraseTM enzyme system has potential applications in some selective media and other diagnostic tests specified for rapid detection of these facultatively anaerobic pathogens. AS

516

Fuchs (RS). ***Listeria monocytogenes*.** *ASEAN Food Journal* 6(1): 1991: 3-13

This review describes the findings and covers the taxonomy and characteristics of *Listeria*, and methods for their isolation from foods. Aspects like outbreaks of listeriosis and occurrence of *L. monocytogenes* in foods, effects of heat, chilling and

freezing, effects of pH, additives, irradiation, sanitising agents are briefly covered. 108 references. SRA

Salmonella

517

Martin (A) and Katz (SE). **A resuscitation/selection system for rapid determination of *Salmonella* in foods.** *Journal of the Association of Official Analytical Chemists* 74(3): 1991: 522-525

A resuscitation medium was developed consisting of a trypticase soy broth base supplemented with 0.5% yeast extract, 0.25% sodium pyruvate, 0.01% sodium thioglycollate, and 0.1% chicken fat. After a resuscitation period of 4 h, the medium was made selective by addition of either sodium thiosulphate, bile salts and iodine, or sodium selenite and L-cystine. The new selective medium was incubated for 16 h. The presence or absence of *Salmonella* was determined by the *Salmonella*-Tek antibody-based detection kit. The present system was compared with a method of the Bacteriological Analytical Manual (BAM) for naturally contaminated foods. Nineteen egg products were screened: 3/19 were positive using the BAM method, 0/19 were positive using the present system. Seventeen chicken samples were assayed: 10/17 were positive using the BAM method; 13/17 were positive using the present system. Of 8 pepper samples, 4/8 were positive using the BAM method; 6/8 were positive using the BAM method, 7/8 were positive using the present system. Of 6 onion products sampled, 5/6 were positive using the BAM method; 6/6 were positive using the present system. AS

Fungi

518

Pasculli (R), Geraeds (C), Voragen (F) and Pilnik (W). **Characterization of polygalacturonases from yeast and fungi.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 63-70

Three endopolygalacturonases (endo-PG) were purified from lab. *Kluyveromyces fragilis* culture (PG I) and from commercial pectinase preparation based on *A. aculeatus* (PG II) and *A. niger* (PG III). Their action on six different substrates was studied, which were prepared from apple and sugar-beet pectins and modified for specific degrees of methyl- and acetyl-esterification. Degradation of these substrates by the three endo-PGs was measured by HPLC and reducing end-groups analysis. PG action was seen to be limited strongly by methyl ester and acetyl groups and significantly by the neutral sugar side chains of the beet pectin. On de-esterified apple pectin PG I showed the degradation pattern of

multichain attack whereas PG II and PG III acted according to a single chain multiple attack mechanism. PG II was the only enzyme that produced a lot of monomer. PG I could not split dimers and PG I and PG III did not seem able to hydrolyze trimers, which accumulated in the hydrolysis products. Results obtained with demethylated sugar-beet pectin showed that acetyl groups influenced the degree of breakdown rather than the rate of breakdown. AS

Mushrooms

519

Joshi (VK), Seth (PK), Sharma (RC) and Sharma (R). **Standardization of a method for the preparation of sweet chutney from edible mushrooms *Agaricus bisporus* (L.).** *Indian Food Packer* 45(2): 1991: 39-43

Two types of button mushroom (*Agaricus bisporus*) chutney by 7 (A, B, C, D, E, F and G) different recipes were prepared and microbial and chemical analysis were carried out. The product without pre-cooking in the cooker had considerable number of microorganisms while these were not found in pre-cooked mushrooms. The total soluble solids of the product ranged from 55 to 71.5° B and acidity 0.95 to 2.14%. No significant difference was observed between the colour of the products in all recipes. The product with shreds from the recipe G had better sensory qualities and good shelf-life. VKR

Yeasts

520

Agab (MA) and Collins (M). **Effect of treatments environment (temperature, pH, water activity (a_w)) on the heat resistance of yeasts.** *Journal of Food Science and Technology (India)* 29(1): 1992: 5-9

Yeast cultures of *Debaromyces hansenii* Y-7268 *Kluyveromyces bulgaricus* SG 120, *K. fragilis* NCYC 587, *Saccharomyces cerevisiae* SG 271, *S. cerevisiae* NCYC 716, *S. chevallieri* SG 65 and *S. uvarum* PS 22 were used in this study. The highest survival levels in buffer occurred at pH 6 or occasionally at pH 5.4 and the lowest at pH 7, whilst in a_w reduced menstruum highest survivor levels at pH 6 and 7 and the lowest at pH 5.4. Plasmolysis of yeast cells conferred a higher degree of resistance to heat treatment especially where 60% sucrose was used as a plasmolysing agent enabling 2/3 yeasts used to survive 5 C higher temp. than normal. AS

521

Agab (MA) and Collins (M). **Effect of heat treatment on aerobically and anaerobically grown or starved yeast cell in different pH menstrua.** *Journal of Food Science and Technology (India)* 29(1): 1992: 10-13

Yeast used in this study were *Hansenula subpelliculosa* Y-1090, *Kluyveromyces bulgaricus* SG 120, *Kluyveromyces lactis* Y-8279, *Saccharomyces cerevisiae* NCYC 716 and *Saccharomyces uvarum* PS 22. Yeasts grown anaerobically before heat treatment displayed higher levels of survival only at the lowest treatment temp. (50 C) used. This might be explained by either changes in membrane lipid comp. or the reduction in levels of cytochrome oxidase in cells grown under anaerobic conditions. Cell starvation prior to heat treatment only enabled yeasts to withstand the same heat treatments as normally grown cells although in 2/3 of the yeasts tested a significant ($P > 0.05$) higher proportion of heat treated starved cells survived any one heat treatment. AS

522

Hart (RA), Mo (O), Borius (F) and Fung (DYC). **Comparative analysis of trypan blue agar and Congo red agar for the enumeration of yeast and mold using the HGMF system.** *Journal of Food Safety* 11(3): 1991: 227-230

Enumeration of yeast and molds from 39 food samples, including 6 dairy products, 2 meat products, 5 cereal products, 9 fruits, 4 vegetables, 6 beverages, 4 spices, and 3 condiments on Trypan blue (at 1:10,000 dilution) in potato dextrose agar (Trypan blue agar) was compared with Congo red (at 25:1,000,000 dilution) in potato dextrose agar (Congo red agar) using the hydrophobic grid membrane filter (HGMF) technique of the ISO-GRID system. Yeast and mold grew well on both Trypan blue agar and Congo red agar, producing blue and red colonies, resp., in the ISO-GRID system, when examined in incandescent light. However, not all yeast and mold colonies grown on Congo red agar fluoresced under ultraviolet (UV) light (a recommended observation procedure). Thus, results indicated that Trypan blue agar observed in incandescent light is more convenient to use for enumerating yeast and mold in food samples. AS

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

523

Yoshida (A), Takagaki (Y) and Nishimune (T). **Enzyme immunoassay for hen egg white lysozyme used as a food additive.** *Journal of the Association of Official Analytical Chemists* 74(3): 1991: 502-505

524

Matsunaga (T). **New labeling requirements of food additives in Japan.** *Packaging Japan* 12(62): 1991: 22-26

This article deals extensively on the historical background of the Japanese food sanitation law and the new labeling requirements of food additives - scope of labeling requirements; name of the additives; labeling by category name and individual name; labeling by collective name; exemption from labeling requirements; food labeling requirements. Examples (carbonated diluted juice, sausage instant Chinese noodle, bread and soy sauce) of changes in labeling of food additives are given. CSA

Colourants

Annatto

525

Aparnathi (KD) and Sharma (RS). **Annatto colour for food: A review.** *Indian Food Packer* 45(2): 1991: 13-27

Annatto, a vegetable colouring matter is derived from the pericarp of the seeds of *Bixa orellana* L. In this review, aspects covered include: chemistry, manufacturing methods, factors contributing to storage stability, analytical aspects like extraction, resolution techniques, detection, standards and legislation and use in food, non-food, and pharmaceutical preparations. VKR

CEREALS

526

Becker (R), Wagoner (P), Hanners (GD) and Saunders (RM). **Compositional, nutritional and**

functional evaluation of intermediate wheatgrass (*Thinopyrum intermedium*). *Journal of Food Processing Preservation* 15(1): 1991: 63-77

'Oahe' Intermediate Wheatgrass (IWG) having higher levels of protein (nutritionally limiting in lysine like wheat but higher levels of other amino acids) (20.8%) fat (3.21%) and ash (2.64%) than wheat was found without gluten and significant amounts of antinutrients. Stone milling of IWG kernels gave flour with farinograph characteristics more similar to whole wheat flour than flours made from impact and rolling milling. A sensory panel showed preference to appearance, texture and flavour of bread, muffins, cookies and cake containing different levels of IWG flour. SD

527

Persson (H), Nyman (M), Liljeberg (H), Onning (G) and Frolich (W). **Binding of mineral elements by dietary fibre components in cereals. In vitro (III).** *Food Chemistry* 40(2): 1991: 169-183

Soluble fibre fractions from barley flour, whole grain rye flour and oat bran showed considerable association with Cu (II), Cd (II) and Zn (II) ions the ability of which to form complexes was in the order Cu (II) > Zn (II) approx. equal to Cd (II) and the order of interaction barley > oats approx. equal to oats approx. equal to rye, important complex agent being phytic acid with pH 3.5 - 5.0, especially for oats. β -glucans from barley showed no metal complexing ability. SD

528

Letellier (MN) and Cuq (JL). **In vitro evaluation of available lysine in cereal products by near infrared reflectance spectroscopy.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 17-22

529

Wood (PJ), Weisz (J) and Blackwell (BA). **Molecular characterization of cereal β -D-glucans. Structural analysis of oat β -D-glucan and rapid structural evaluation of β -D-glucans from different sources by high-performance liquid chromatography of oligosaccharides released by lichenase.** *Cereal Chemistry* 68(1): 1991: 31-39

Oligosaccharides obtained by the action of (1-3), (1-4)- β -D-glucan-4-glucanohydrolase (lichenase) on the (1-3),(1-4)- β -D-glucan of oats (oat β -glucan) were characterized by methylation analysis. The polysaccharide was confirmed as composed mainly of β -(1-3)-linked cellotriosyl and cellotetraosyl units with a small amount of regions containing 4-8 consecutive (1-4)-linked units. ^{13}C -Nuclear magnetic resonance data confirmed these structural

features. The oligosaccharides released by lichenase were analyzed by elution with water from a Bio-Rad HPX-42A HPLC column with peak detection by an automated orcinol-sulphuric acid reaction, and the ratio of tri- to tetrasaccharide was determined. This ratio defines the major structural repeating units of the cereal (1-3),(1-4)- β -D-glucans and may be determined without prior purification of polysaccharide. The molar ratio of tri- to tetrasaccharide determined for oats was 2.1 plus or minus 0.1, for barley 3.2 plus or minus 0.3, and for wheat 3.5 plus or minus 0.4. No difference was detected between the β -D-glucan from oat brans and the whole groat. In addition, the areas or heights of the major tri- and tetrasaccharide reaction products were used for quantitation by calibration with a β -D-glucan standard. AS

530

Lamkin (WM), Unruh (NC) and Pomeranz (Y). **Use of fluorometry for the determination of uric acid in grain. Elimination of interfering fluorescence.** *Cereal Chemistry* 68(1): 1991; 81-86

The possible use of fluorometry for determining the amount of uric acid in grain, to measure insect contamination or monitor infestation was investigated. In 0.20M sodium phosphate buffer, pH 12.3, the excitation max. for the fluorescence of uric acid was 342 nm, and the emission peak was at 408 nm. In alkaline solution, the fluorescence at 408 nm was independent of pH over the range of 11 - 12.5. Fluorescence at 408 nm was linear function of uric acid concn. to several hundred p.p.m. with a lower limit of detection in the range of tenths of a p.p.m., a sensitivity sufficient for the analysis of uric acid in commercial grain samples. Direct fluorometric analysis of uric acid was not successful as a result of the presence in grain extracts of an interfering fluorescence with an excitation max. at 290 nm and an emission peak at 354 nm. The interfering fluorescence was shown to be due to the extraction, at the pH of approx. 9 used to extract the uric acid, of tryptophan-containing proteins and peptides. Most of the interfering fluorescence was from proteins with mol. wts. above 5,000, but a significant portion was due to compounds with mol wts. below 500. Quantitative removal of the interfering fluorescence was achieved by a cation-exchange procedure using Supelclean LC-SCX solid-phase extraction tubes, which contained 3-propylsulfonyl groups chemically bonded to 40- μ m silica particles with 60-A pores. AS

531

Reid (JF) and Litchfield (JB). **Recent developments in process sensors and principles of selection.** *Cereal Foods World* 36(4): 1991; 358-358, 360-362

This article highlights sensor technology important to the cereal processing industry that currently are being developed. The sensing technologies highlighted are machine vision sensing, nuclear magnetic resonance spectroscopy and imaging and biosensors. BV

532

Isdale (CE). **Opportunities for process control in the cereal industries.** *Cereal Foods World* 36(4): 1991; 364, 366-367

Briefly discusses about advanced, robust process control techniques by use of proven examples. Control techniques, rotary steam tube dryer control, multiple effect evaporator and heat exchanger are covered in this article. BV

533

Koseoglu (SS), Rhee (KC) and Lusas (EW). **Membrane separation and application in cereal processing.** *Cereal Foods World* 36(4): 1991; 376-383

This feature article describes the various aspects of membrane separation such as operation principle, membrane design and membrane application. The application of membrane process in food processing particularly with respect to separation of wheat gluten and starch, high fructose corn syrup and corn wet milling are discussed. BV

Barley

534

Ilori (MO), Akingbala (JO), Oguntimein (GB) and Ogundiwin (JO). **Adaptation of a conventional mashing profile for barley malt to sorghum malt.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991; 29-33

The temp. programmed mashing profile for barley malt employed by most breweries in Nigeria was adapted for the mashing of sorghum malt. The effect of the addition of maize grits as an adjunct during the mashing process was also examined. The unhopped wort obtained was lower in extract, fermentable sugars and nitrogen than the commercial wort. However, the use of 10 to 25% maize grits as adjunct improved the properties of the sorghum malt wort. 20 to 25% adjunct appeared to be the optimum. The beer produced from the fermented wort gave apparent extract, real extract, alcohol by wt., colour, pH, titratable acidity, fermentable sugars and caloric levels similar to those of a commercial beer. AS

Oat

Oat bran

535

Wood (PJ), Welsz (J) and Fedec (P). **Potential for β -glucan enrichment in brans derived from oat (*Avena sativa* L.) cultivars of different (1-3),(1-4)- β -D-glucan concentrations.** *Cereal Chemistry* 68(1): 1991: 48-51

Flour and bran of oats were fractionated into coarse and fines fractions by a simple milling procedure. There were significant differences between cvs in the (1-3),(1-4)- β -D-glucan (β -glucan) concn. of the whole groat (3.91 - 6.82%) and in the bran (5.81 - 8.89%). The av. bran yield of 53.3% produced an av. β -glucan concn. in the bran than was one and a half times the concn. of the groat. Although there was a weakly significant correlation between groat β -glucan and bran β -glucan ($r^2 = 0.823$), there was sufficient variation in the ratio of bran to groat β -glucan (1.28 - 1.60) to observe significant changes in the ranking of cvs for bran β -glucan after milling. The av. starch concn. of the groat (59.1%) dropped to 49.3% in the bran and was raised to 69.7% in the fines fraction. Starch was less variable than β -glucan with a between-cv coeff. of variation of 4.9% in the groat and 6.9% in the bran compared with 15.9 and 13.8% resp., for β -glucan. AS

Rice

536

Dhaliwal (YS), Sekhon (KS) and Nagi (HPS). **Enzymatic activities and rheological properties of stored rice.** *Cereal Chemistry* 68(1): 1991: 18-21

Amylolytic, proteolytic, lipolytic and lipoxygenase changes in milled rice obtained from short-, medium-, and long-grain var. of paddy, one lot stored immediately after harvest at natural moisture and one dried to 12% moisture, were investigated after 1, 6 and 12 months of storage. Paddy samples stored after drying had significantly reduced diastatic, proteolytic and lipase activities, whereas lipoxygenase activity was not altered with drying. Stored samples had increased activities of proteases and lipases, but amylase activity was greater in freshly harvested samples. Dried samples had reduced contents of free amino acids and free fatty acids. With or without drying, free amino acid and free fatty acid content increased during storage. Peak viscosity of milled rice did not change when paddy was dried before storage but it did increase during storage. AS

Rye

537

Delcour (JA), Vanhamel (S) and Hosney (RC). **Physicochemical and functional properties of rye nonstarch polysaccharides. II. Impact of a fraction containing water-soluble pentosans and protein on gluten-starch loaf volumes.** *Cereal Chemistry* 68(1): 1991: 72-76

Rye water-soluble protein-pentosan fractions improve the volume of gluten-starch loaves. A volume dosage curve shows that the optimum concn. for such substances is 2 - 3%. The protein component of the rye material appears to have no effect on the capacity of the complex to enhance loaf volume because deproteinization does not result in a loss of the complex's activity. Ferulic acid residues of the water-soluble pentosans of rye or wheat were not involved in the interactions leading to larger loaf volumes because removal of these moieties or the addition of an excess of ferulic acid in the baking formula did not impair the role of the rye protein-pentosan material in gluten-starch systems. The action of the nonstarch polysaccharides probably is related to an increase in dough viscosity because similar baking results were found when oat β -glucan, corn bran hemicellulose, or xanthan gums were used. AS

Triticales

538

Saxena (AK), Bakhshi (AK), Sehgal (KL) and Sandha (GS). **Effect of grain texture on various milling and end use parameters of newly bred advanced triticale (wheat x rye) lines.** *Journal of Food Science and Technology (India)* 29(1): 1992: 14-16

With the increase in grain hardness, there was a significant decrease in ash content of flour. Soft textured triticales contained a significantly higher amount of protein in the flour. With increase in hardness, a significant decrease was observed in loaf as well as specific vol. The cookies prepared from soft and medium hard textured triticales recorded significantly higher cookie spread as compared to cookies from hard textured triticales. The soft and medium hard textured triticales recorded significantly higher break fraction B₁ and break fraction B₂ as also flour yields. The reduction fraction C₃, finished flour and shorts were significantly higher in hard triticales which recorded significantly lower bran recoveries. AS

539

Narpinder Singh, Sekhon (KS) and Rajvir Singh. **Studies on the improvement of quality of karnal bunt infected wheat. III. Minerals composition, chapathi and cookie making properties.** *Journal of Food Science and Technology (India)* 29(1); 1992; 1-4

The effect of debranning and lye peeling on the minerals comp. and chapathi and cookie making properties of good and bunt infected wheat was studied. Most of the minerals, significantly increased with the increase in bunt infection. Debranning and lye peeling significantly lowered the minerals in whole wheat meal and flours. The spread of cookies decreased with the increase in bunt infection. Debranning and lye peeling significantly improved the spread factor of 10% infected wheat. Overall acceptability of cookies and chapathies progressively decreased with the increase in the level of infection. Debranning and lye peeling produced good quality cookies and chapathies from a wheat having 5% infection as those from good wheat. AS

540

Chauhan (GS) and Santhosh Kumari. **Evaluation of wheat-defatted soy flour blends for chapathi-making quality.** *Beverage and Food World* 17(1); 1990; 40-42

The chapathi prepared from dough of wheat-defatted soy flour (10% blends) was evaluated for sensory properties and showed complete inactivation of trypsin inhibitor activity (12.5%) and phytic phosphorus was slightly degraded. An 4 - 5 folds increase in reducing and non-reducing sugars. The protein content increased from 12.6 - 20.0% and moisture retention from 29.6 - 37.7% indicating longer freshness of chapathies. SRA

541

Kobrehel (K), Bois (J) and Falmet (Y). **A comparative analysis of the sulphur-rich proteins of durum and bread wheats - their possible functional properties.** *Cereal Chemistry* 68(1); 1991; 1-6

Comparison of the solubility and the electrophoretic characteristics of sulphur-rich (chloroform/methanol-soluble) proteins of durum and bread wheats showed considerable differences. Most of these proteins were readily extracted from bread wheat with the albumin-globulin fraction, whereas only some of them were extracted from durum wheat under similar conditions. The remaining sulphur-rich protein fraction of durum wheat could be separated from the other glutenin

components with Na-tetradecanoate. In bread wheat, some of the sulphur-rich proteins became bound to other gluten components during dough formation, probably through hydrophobic interactions. They were extracted from gluten partly with the gliadin and partly with the glutenin fraction. Results suggested that these proteins, as part of the gluten network, may have a functional role in the formation of dough. AS

542

Gaines (CS). **Associations among quality attributes of red and white soft wheat cultivars across locations and crop years.** *Cereal Chemistry* 68(1); 1991; 56-59

The means and distribution of correlation coeff. among seven principal wheat and flour quality attributes (test wt., break flour yield, straight-grade flour yield, flour protein content, sugar-snap cookie diameter, white layer cake vol., and alkaline water retention capacity) of 53 soft wheat cvs grown in the eastern United States were compared relative to pericarp colour (red or white). Quality attributes of red wheat cvs usually were adversely affected by protein content. Quality attributes of white wheat cvs were relatively unaffected by protein content. Among most red wheats, but not among most white wheats, high protein content was correlated with harder kernel texture. Break flour yield was correlated with alkaline water retention capacity for most white wheats, but not for red wheats. Within each colour class, individual cvs varied greatly in correlations among quality tests. AS

543

Giner (SA), Lupano (CE) and Anon (MC). **A model for estimating loss of wheat seed viability during hot-air drying.** *Cereal Chemistry* 68(1); 1991; 77-80

A first-order kinetic model for estimating the loss of viability of wheat seeds during hot-air drying is presented. Model parameters were obtained by fitting the integral form of the model to grain germination percentage, moisture, temp. and drying time. These data were determined throughout experimental drying in fluidized layers 0.08 m deep. Grain temp. varied continuously as in full-scale dryers. The Arrhenius activation energy E_a of the process was found to be 81.1×10^3 cal/mol, and the Arrhenius preactivation factor was determined to be a function of kernel moisture content. The model was compared with other experimental data, and the observed and predicted germination agreed within plus or minus 4.2% points. The model will be useful in conjunction with drying simulation models to help in the design and operation of wheat dryers. AS

544

Feng (G-H), Chen (M), Kramer (KJ) and Reeck (GR). **Reversed-phase high-performance liquid chromatographic separation of wheat proteinaceous inhibitors of insect and mammalian α -amylases.** *Cereal Chemistry* 68(1): 1991: 95-99

A heat-treated 0.15M NaCl extract of wheat flour was separated into four proteinaceous fractions by ammonium sulphate precipitation. Each fraction had a distinct comp. of polypeptides with apparent molecular mass of approx. 14 kDa and a distinct inhibitory spectrum of activity against human, porcine and insect (confused flour beetle and rice weevil) α -amylases. More than 10 peaks in each fraction were resolved by reversed-phase high-performance liquid chromatography (RP-HPLC) with mixtures of acetonitrile and H₂O as the mobile phase. RP-HPLC separations revealed more heterogeneity in wheat α -amylase inhibitors than was apparent from either nondenaturing or denaturing sodium dodecyl sulphate gel electrophoresis. RP-HPLC fractions were characterized further by polyacrylamide gel electrophoresis and by assaying inhibitory activity against the four different α -amylases. At least five different HPLC fractions were found to be selective inhibitors of insect α -amylases, some of which belong to the 0.28 family of inhibitors. Combining certain RP-HPLC fractions resulted in dramatic increases in inhibitory activity. These results suggest that RP-HPLC resolves the oligomeric inhibitors into their monomeric forms and that both the activity and selectivity of the inhibitors can be influenced by recombination of individual polypeptides. AS

545

Williams (PC). **Prediction of wheat kernel texture in whole grains by near-infrared transmittance.** *Cereal Chemistry* 68(1): 1991: 112-114

Wheat proteins

546

Krishnan (HB), White (JA) and Pueppke (SG). **Immunocytochemistry of wheat storage proteins: Effect of particle size of protein A - gold on labeling intensity.** *Cereal Chemistry* 68(1): 1991: 108-111

Prolamins in wheat endosperm were localized by immunocytochemistry with colloidal gold particles of different sizes as markers. These proteins were localized in the protein bodies and in vesicles associated with the Golgi apparatus. The intensity of labeling was significantly different, depending on the size of the gold particles. Intense labeling of

protein bodies and Golgi-complex vesicles was obtained with 5- and 10-nm gold markers. Labeling was much less efficient with 20-nm particles. The size of protein A-gold markers determines in large part, their binding efficiency. Consequently, careful attention should be given to size when choosing gold markers for immunocytochemical studies, especially when quantification is a consideration. AS

MILLETS

Bajra

547

Patel (KV) and Parameswaran (M). **Effects of heat treatment on lipid degradation in bajra flour during storage.** *Journal of Food Science and Technology (India)* 29(1): 1992: 51-52

Moisture content and peroxide value increased while lipase activity and free fatty acids fluctuated in bajra flour during storage. Gas liquid chromatographic profile of free fatty acids showed a fall in the proportions of oleic, linoleic and palmitic acids with storage. Heating the flour prior to storage at 50 or 100 C for 2 h lowered the rate of lipid degradation. AS

Corn

548

Adeyemi (IA), Akanbi (CT) and Fasoro (OG). **Effect of soy fractions on some functional and rheological properties of maize-banana mixtures.** *Journal of Food Processing Preservation* 15(1): 1991: 31-43

Moisture, protein, fat and ash of drum dried maize-banana mix (soy bean flour, soy milk/soy residue, maize grits and banana) were 5.60 - 9.18%, 17.89 - 22.80%, 0.46 - 7.13% and 0.75 - 2.46% resp. Bulk density for the product was 0.30 - 0.41 g/mL while that of the control containing skim milk instead of soy was 0.46 g/mL. The product was pseudo-plastic according to rheological data with power law parameters depending on the formulation. Soy-maize-banana product with soy milk showed better sensory quality. SD

549

Tabil (LG), Noomhorm (A) and Verma (LR). **Breakage susceptibility of shelled corn due to rehydration and redrying.** *Journal of Food Process Engineering* 14(1): 1991: 69-82

Processing activities such as drying expose grains to temp. and moisture gradients resulting to increased susceptibility of corn breakage. The effect of rehydration and redrying rates on the breakage susceptibility of corn was compared and evaluated. Dried corn samples were rehydrated and redried artificially. Breakage susceptibility of the samples were tested using a food grinder (blender) and Instron testing machine. Treatments consisting of a cycle of rehydration and redrying represented different rates of moisture sorption. Initial sample moisture, rehydration methods and redrying temp. were used in comparing breakage susceptibility. Samples of low initial moisture had higher breakage susceptibility as compared to higher initial moisture samples. The rehydration method representing the highest moisture adsorption rate resulted to samples which were more susceptible to breakage than the two rehydration methods representing intermediate and slow rates of moisture adsorption. Temp. of redrying also showed significant effect with high temp. (80 C) resulting to grains with higher breakage susceptibility compared to samples redried with unheated air (30 C). Breakage susceptibility increased when samples were rehydrated and increased much more when they were redried. AS

550

Steinke (JD) and Johnson (LA). **Steeping maize in the presence of multiple enzymes. I. Static batchwise steeping.** *Cereal Chemistry* 68(1); 1991; 7-12

The feasibility of incorporating multiple enzymes in steeping solutions to reduce steeping time and enhance starch separation during wet milling of maize was investigated. Maize kernels were steeped batchwise in a 0.20% sulphur dioxide solution for 48 h and 24 h, in a sulphur dioxide solution containing an additional 1.25% of a commercial multiple-enzyme preparation (Novo SP249) for 24 h, and in a sulphur dioxide solution containing an additional 1.25% of an experimental multiple-enzyme preparation (cellulase, hemicellulase, β -glucanase, pectinase and bromelin) for 24 h. Maize steeped for 48 h in 0.20% sulphur dioxide exhibited normal wet milling characteristics, but maize steeped in the same solution for only 24 h showed poor starch-fiber and starch-gluten separations during wet milling. Maize steeped in sulphur dioxide plus either treatment of multiple enzymes produced fraction yields and purities comparable to those of maize steeped for 48 h in 0.20% sulphur dioxide alone, suggesting that steeping maize in the presence of multiple enzymes and sulphur dioxide enhances separation of wet-milling fractions and may facilitate a reduction in steeping time. AS

551

Steinke (JD), Johnson (LA) and Wang (C). **Steeping maize in the presence of multiple enzymes. II. Continuous counter current steeping.** *Cereal Chemistry* 68(1); 1991; 12-17

A lab. procedure for steeping maize, which closely simulates commercial practice in wet milling, was developed and used to determine the effects of multiple-enzyme treatment on wet-milling performance. Yellow dent maize was continuously and countercurrently steeped for 24 h in a solution containing 1.25% of a multiple-enzyme preparation and 0.20% sulphur dioxide and then wet milled. Yields and protein contents of wet-milling fractions were compared with those of maize steeped for 48 and 24 h in 0.20% sulphur dioxide alone. Reducing the steeping time without adding enzymes reduced starch yield and increased the protein content of the starch. Maize steeped with multiple enzymes and sulphur dioxide for 24 h gave nearly the same yields and purities of fractions as maize steeped for 48 h in sulphur dioxide alone. Thermal properties, pasting properties, and colours of the starch were unaffected by steeping in multiple enzymes and sulphur dioxide. AS

552

Mestres (C), Louis-Alexandre (A), Matencio (F) and Lahlou (A). **Dry-milling properties of maize.** *Cereal Chemistry* 68(1); 1991; 51-56

Chemical composition and physical properties of 18 African maize samples were determined and correlated with their dry-milling performance. Semolina yield could be predicted (at almost 60%) from ash content (main factor, correlation coeff. -0.64) and sphericity or dent kernel percentage (cofactors). Vitreousness was not significantly correlated (at the 0.05 level) with semolina yield. Vitreousness, which was very time-consuming to measure, could be evaluated at almost 90% from density and dent kernel percentage or ash content. Lipid content of recovered semolinas was also positively correlated with kernel ash content. Thus, maize var. with low ash content gave high yields of semolina with low lipid content. AS

Pearl millets

553

Neelam Khetarpaul and Chauhan (BM). **Sequential fermentation of pearl millet by yeasts and lactobacilli. Changes in available carbohydrates content.** *Food Chemistry* 40(2); 1991; 235-240

Sequential culture fermentation (SCF) with yeasts (*Saccharomyces cerevisiae* or *Sacch. diastolicus* followed by lactobacilli (*Lactobacillus brevis* or *L.*

fermentum) at 30 C for 72 h significantly reduced the starch content of pearl millet (*Pennisetum typhloideum*) flour (lowest when carried out by *Sacch. diastolicus* followed by *Sacch. brevis*); total soluble reducing and non-reducing sugars were also reduced significantly by SCF which may be due to utilisation of sugars by the fermenting microflora. SD

Sorghums

554

Almeida-Dominguez (HD), Serna-Saldivar (SO) and Rooney (LW). **Properties of new and commercial sorghum hybrids for use in alkaline-cooked foods.** *Cereal Chemistry* 68(1): 1991: 25-30

Twelve sorghum with different grain characteristics were cooked in lime, steeped for 5 h, washed and stone-ground into masa. Masa was sheeted, formed and baked into tortillas. Nixtamal with 49 - 54% moisture content was acceptable for stone grinding, when water was added during grinding to produce masas with 50 - 59% moisture. Masas had adequate machinability and produced acceptable table tortillas. Tortillas weighed 25 - 29 g with 45 - 49% moisture. All fresh, nonwaxy tortillas had acceptable texture. However, waxy sorghum produced sticky masa and tortillas. The av. conversion ratio of grain to tortillas was 1.5 kg of fresh tortillas/kg of raw grain. Dorado, Sureno, and Tortillero from Central America and hybrids ATX631 x TX435 and ATX631 x TX8505 from Texas Agricultural Experiment Station, College station, gave tortillas with the best colour and texture. Sorghums with tan plant colour like Dorado and Sureno produced white tortillas, whereas ATX631 x TX435 and ATX631 x TX8505 produced yellow tortillas. Soft sorghums (Dorado and Malcillos Criollos) had the shortest optimum cooking times. White sorghums differed in cooking characteristics, but most produced tortillas with acceptable colour and texture. AS

PULSES

Cowpeas

555

Shinde (GB), Adsule (RN) and Kale (AA). **Effect of dehulling and cooking treatments on phytate phosphorus, polyphenols and trypsin inhibitor activity of cowpea (*Vigna unguiculata* L. Walp.) seeds.** *Indian Food Packer* 45(2): 1991: 03-05

In cowpea (*Vigna unguiculata* L. Walp) cv. 'NI-434', 'Pusa Nylon' and 'T-3' seeds were selected for the

study. Among the var. the total 'T-3' contained higher total P (469 mg/100 g) and phytate P (221 mg/100 g) followed by 'Pusa Nylon' and 'NI-434'. The content of total and phytate P was low in hulls than in cotyledons. Dehulling increased phytate P in cotyledons. Dehulling and cooking reduced the polyphenol content by 70% and 40% resp. Dehulling alone increased the trypsin inhibitor activity, but cooking of whole seeds and cotyledons reduced the trypsin inhibitor activity by 87 - 90%. The polyphenol content was max. in the red coloured cv. 'T-3' and min. in white coloured cv. 'NI-434', therefore it is suggested that white seeded cv. may be given preference in the breeding programme. VKR

556

Ramesh (GS) and Nirankarnath. **Effect of catalase and peroxidase enzymes on acceptability of frozen green cowpea pods.** *Beverage and Food World* 17(1): 1990: 29-31

This study indicates a significant difference in overall acceptability of catalase-free or catalase-added samples and peroxidase-free or peroxidase added samples. The main difference was in their aroma and texture but no significant difference was noted in their colour or taste. Further it has shown that good quality frozen cowpea pods can be obtained by blanching them for 16 min in hot water at 95 C or 7 min in boiling water (99 C) and presence of residual peroxidase activity would not affect their acceptability. Hence, catalase should be used as an index of blanching green cowpea pods for freezing. SRA

Dry beans

557

Mafuleka (MM), Ott (DB), Hosfield (GL) and Usebersax (MA). **Dry bean (*Phaseolus vulgaris*) hardening and the consequences of pectin methylesterase activity in storage.** *Journal of Food Processing Preservation* 15(1): 1991: 1-18

Pectin methylesterase (PME) activities and hardness of decorticated Malwi bean var. evaluated at 4, 8 months storage at 0.55 a_w , 0.85 a_w and 10, 35 C showed significantly higher values than control (2 C, 0.30 a_w) and also between 8 and 4 months irrespective of a_w . Hardness, which increased due to storage, temp. and a_w , showed significant varietal difference, being not clearly influenced by PME. SD

Peas

558

Abdel-Kader (ZM). **A study of the apparent diffusion coefficients for ascorbic acid losses from peas during blanching in water.** *Food Chemistry* 40(2); 1991; 137-145

The apparent diffusion coeff. (D) for ascorbic acid loss from peas calculated after blanching at 50, 60, 70, 80 and 90 C for 0, 2, 4, 6, 8 and 10 min ranged from 0.94×10^{-8} to $1.94 \times 10^{-8} \text{ m}^2\text{s}^{-1}$, having an activation energy of $18.71 \text{ kJ mol}^{-1}$ and confirmed that, if there was sufficient agitation of blanch water the leaching of ascorbic acid was controlled by diffusion only. SD

OILSEEDS AND NUTS

Groundnuts

Groundnut butter

559

Anon. **The production of peanut butter.** *Confectionery Production* 57(5); 1991; 378-381

The Fryma grinding and cooling plant ensures the production of a high quality peanut butter. BV

Madhuca

560

Ajay Singh and Singh (IS). **Chemical evaluation of mahua (*Madhuca indica*) seed.** *Food Chemistry* 40(2); 1991; 221-228

Seeds of mahua fruits contain 16.9 and 51.5% protein and oil, resp. Fatty acid composition of oil revealed the presence of oleic acid (46.3%) and linoleic acid (17.9%) as the major unsaturated and palmitic acid (17.8%) and stearic acid (14.0%) as major saturated fatty acids. The defatted mahua seed meal contains 29.4% protein and 9.8% saponins which are toxic at this level. However, the levels of saponins could be reduced by treatment with isopropanol. The defatted flour showed good oil absorption and emulsification properties. The solubility of protein was high at both acidic and alkaline pH with a min. at 4.0. The *In vitro* digestibility of mahua seed flour after treatment with isopropanol was found to be 81%. Polyacrylamide gel electrophoresis showed five bands with different relative mobilities and they contained both high and

low mol. wt. protein fractions. Detoxified mahua seed flour appears to be a good source of protein for food feed products. AS

Soybeans

561

Laszlo (JA). **Changes in endogenous and exogenous iron-reducing capability of soybean hull during development.** *Cereal Chemistry* 68(1); 1991; 21-24

Hulls (seed coats) of soybean (*Glycine max*) seeds contain relatively high levels of bioavailable iron. The presence of some iron in the Fe(II) oxidation state may be a contributing factor to its availability. Apparent Fe(II) and Fe(III) content of hulls of several soybean cultivars was followed throughout development. Iron was extracted from hulls with 2N HCl. Fe(II) and Fe(III) content of extracts was measured with bathophenanthrolinedisulfonic acid or by ion chromatography. Extracts of Immature Century and Williams 82 hulls had higher levels of Fe(II) than fully mature hulls. Iron was all Fe(II) in extracts of Sooty, Wilson and Peking hulls from late growth stages (late linear seed fill to harvest maturity). Conclusive assessment of the *in situ* hull iron oxidation state was not possible because extracts of all cultivars and stages contained reductants that were endogenous to the tissue or were generated during extraction. These reductants may influence bioavailability to a greater extent than hull iron valence. AS

Soy products

Soy milk

562

Nsofor (LM) and Anyanwu (KB). **Effect of heat processing on refrigerated shelf-life of concentrated soy milk beverage.** *Journal of Food Science and Technology (India)* 29(1); 1992; 40-44

The refrigerated shelf-life of concentrated soy milk beverage processed with different heat treatments was evaluated. Visible coagulation time (shelf-life) of beverage decreased with increased concn. of its total solids. Heat sterilization alone or in combination with simmering generally produced instant coagulation in soy beverage of 32% total solids and short-life in beverages of 16 and 21% solids content. Combination of simmering and pasteurization produced visible coagulation time of 10 wks in 32% solids beverage stored in air-tight container. Linear correlation coeff. of -0.89 was deduced between visible coagulation time and pH of freshly coagulated beverage. Simmering plus

pasteurization generally produced lower pH at coagulation compared to other heat treatment combinations. AS

Soy proteins

563

Lapveteläinen (A), Kerrola (K) and Linko (R). **Effect of phytic acid hydrolysis on the functionality of soy protein isolate.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 71-75

The phytate of soy protein isolate was eliminated on a pilot scale using a new enzymatic method. In assessing the influence of the phytase treatment on the functionality of the soy protein, the solubility, water absorption, foaming and emulsifying properties of the phytate-free and the control isolate were evaluated in the range of pH 3.0 - 7.0. The overall changes in the functionality of the protein were small. The greatest differences between the isolates were detected at single pH-values, or at a narrow pH-range. The protein solubility in distilled water increased due to phytic acid hydrolysis at pH 3.0 and 3.5. The isolates clearly differed from each other in their water absorption capacity at pH 3.5 and 6.0. The elimination of phytic acid change the foam expansion capacity of 10% isolate dispersion only at pH 4.0. The differences between the isolates at pH 4.0 were smaller when the foam expansion was determined for 5% dispersion. The highest foam stability for control isolate was found at pH 3.0 and for phytate-free isolate at pH 6.0. The emulsion capacity increased due to enzymatic treatment at pH 3.0. Emulsion stability was the same in both isolates, except at pH 4.0. AS

564

Dahl (SR) and Villota (R). **Effect of thermal denaturation on the texturization of soybean protein via twin-screw extrusion.** *Canadian Institute of Food Science and Technology Journal* 24(3/4): 1991: 143-150

A twin-screw extruder was used to evaluate the texturization performance of thermally modified soybean flours, with nitrogen solubility indices (NSI) ranging from 80.0 - 8.6%. Heat processing resulting in NSI values between 35.4 and 23.7% was shown to decrease expansion and water absorption capacity and increase shear peak force of the finished product. Mild heat denaturation (57% NSI) resulted in products with excellent rheological and functional characteristics. GS

TUBERS AND VEGETABLES

Onions

565

Samaniego-Esguerra (CM), Boag (IF) and Robertson (GL). **Kinetics of quality deterioration in dried onions and green beans as a function of temperature and water activity.** *Food Chemistry* 24(1): 1991: 53-58

The kinetics of nonenzymic browning and thiosulphinate loss in dried onion flakes, and chlorophyll loss in dried green beans were studied as a function of temp. and a_w . Nonenzymic browning and chlorophyll loss were found to follow a zero-order reaction, while thiosulphinate loss followed a first-order reaction. Temp. dependence of the reaction rates could be described by the Arrhenius equation. a_w had an influence on the reaction rate constant and on the activation energy. Empirical equations were derived describing these relationships. Mathematical models were developed which successfully predicted the shelf lives of the dried products as a function of temp. and a_w . AS

Beet

566

Vaccari (G), Mantovani (G) and Campli (A). **Beet technological value under mediterranean storage conditions.** *Food Chemistry* 40(3): 1991: 241-249

Beet technological value, for a complete view of the consequences of storage, is determined by non-traditional parameters which relate better to the procedures of processing. Dry substance detn. and comp. of juice extracted at diffusion temp., storage of sound and damaged beets in piles/silo for a max. of 4 days between 20 - 35 C were considered and the results were found relevant to problems of short storage in warm, humid climatic conditions. SD

Carrots

567

Marques (JM), Rutledge (DN) and Ducauze (CJ). **Low resolution pulse NMR detection of the mobilization point of solutes during the drying of carrots.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 93-98

The decrease in the NMR free induction decay signal was studied in air-dried carrot samples. Between 5 and 20% water content, the proportion of slow relaxing components of the transverse relaxation shows a sharp increase, which must be due, to a great extent, to the mobilization of solutes. For the same range of water contents there is a change in

the relaxation mechanisms of the fast relaxing protons. Also, evidence of cross-relaxation phenomena is presented. Since the low resolution proton NMR response depends on the contribution of non-water protons, it is suggested that the state of water cannot be correlated as well absolute NMR values as with particular points observed in NMR parameters plots. A rapid NMR method (about 1 min per sample) adequate for the monitoring of industrial drying is presented. The method allows for the detn. of the mobilization point of solutes. At this point of a_w is around 0.02 units superior to that corresponding to the GAB monolayer value. AS

568

Grewal (KS) and Jain (SC). **Recovery and quality of juice from carrots subjected to heat and pectolytic enzyme treatment.** *Beverage and Food World* 17(1); 1990; 43-45

The juices from carrots heated in (a) 1% acetic acid solution, (b) boiling water (c) steam blanching prior to juice extraction, were compared with juice from raw (untreated) carrots. The results indicate that the yield of juice decreased when carrots were subjected to different heat treatments. It was 5.9% in (a), 13.7% in (b) and 9.8% in (c). The 0.5% level of pectolytic enzyme liquid conc. incubated at 37 C for 12 h showed max. recovery of juice from grated carrots. There was slight off-flavour probably due to acid development, oxidation and fermentation in the juice. SRA

Cassava

569

Balogopalan (C) and Padmaja (G). **Biochemical changes during the solid state fermentation of cassava under uncontrolled conditions.** *Journal of Root Crops* 15(1); 1989; 1-6

Effect of fermentation of cassava and cassava wastes under uncontrolled conditions enhanced the protein content upto 6.3 g/100 g DM in waste alone. 25% addition of cassava leaves increased the keeping quality and raised the protein content to 13.06% in the fermented product but addition of molasses showed no effect. SD

Cassava chips

570

Karuna (MS), Neelakantan (S) and Banumathy (P). **Feasibility of utilizing dried cassava chips for the manufacture of sago.** *Journal of Root Crops* 16(2); 1990; 76-82

Sundried chips of cassava M-4 (sweet) and H-165 (bitter) milled yielded 86.80 and 80.48% flour resp. The creamy white flour scored a reflectance value of only 77.030 and 76.396. The starch and fibre content were 80.825, 79.660 and 0.260 and 0.274% resp. for M-4 and H-165. After 7 washings the reflectance values were 98.57 and 99.10, starch 98.88 and 98.16, fibre 0.20 and 0.20, moisture 10.92 and 10.695, reducing sugar 0.077 and 0.063, total sugar 0.677 and 0.398, ash 0.470 and 0.470; protein 0.30 and 0.30, soluble nitrogen 0.01 and 0.01, phenolics 0.390 and 0.407% for M-4 and H-165 resp. conforming to ISI limits. SD

Potatoes

571

Lisinska (G) and Aniolowski (K). **Organic acids in potato tubers. Part 2. The effect of γ -irradiation on citric and malic acid contents of potato tubers.** *Food Chemistry* 40(2); 1991; 207-212

γ -irradiated potato tuber var. showed lower citric acid and higher malic acid levels than those not exposed to irradiation. Irradiated tubers stored for 6 months exhibited a markedly increased content of the citric acid. Irradiated tubers stored at 13 C, were higher in citric acid than those stored at 4 and 7 C. BV

572

Jaswal (AS). **Quality of French fried potato: Relationship to proteinaceous materials.** *Canadian Institute of Food Science and Technology Journal* 24(3/4); 1991; 151-155

Blanching and frying bear no relationship to the overall qualities of French fried potatoes. On a per g dry wt. basis, crude proteins of low sp. gr. (LSG) potatoes were found to be 98.1 mg of which 65.2 mg were in the true protein form, 19.7 mg as free amino acids and the remainder in the other non-protein nitrogenous form. The high sp. gr. potatoes showed 69.3 mg, 47.6 mg and 11.9 mg as compared to LSG potatoes. GS

Sweet potatoes

573

Mishra (S), Sinha (UP) and Sharma (HM). **Quality studies in sweet potato cultivars in relation to nitrogen fertilization.** *Journal of Root Crops* 16(2); 1990; 142-144

Effect of N (40, 80, 120 kg/ha) fertilization on 12 sweet potato cultivars grown in sandy loam soil with pH, 0.32% organic carbon, 32.51 kg/ha P_2O_5 and 211.7 kg/ha K_2O revealed that reducing sugar

decreased, starch, sucrose and protein per cent increased with increasing levels of N. Reducing sugar was high in 'RS-5' and 'hybrid-5', low in 'kalmegh'; sucrose high in 'pisa' and 'C-71', low in 'X-9' and 'H-96'; protein high in 'X-8', 'X-9' and 'X-6', low in 'kalmegh' and starch high in 'X-8', low in 'RS-5'. SD

Vegetables

574

Lahaye (M). **Marine algae sources of fibers. Determination of soluble and insoluble dietary fibre contents in some 'sea vegetables'.** *Journal of the Science of Food and Agriculture* 54(4); 1991: 587-594

Seven marine algae wakame (*Undaria pinnatifida*), hijiki (*Hijiki fusiformis*), sea spaghetti (*Himanthalia elongata*), arame (*Eisenia bicyclis*), sea lettuce (*Ulva lactuca*), A O nori (*Enteromorpha* spp.), and nori (*Porphyra tenera*) were analysed for their soluble and insoluble dietary fibre contents. These sea weeds are rich in dietary fibres with total dietary contents varying between 32.7 and 74.6% (on a dry wt. basis) of which 51.6 to 85.0% are water soluble. GS

575

Srikanth (R) and Raja Papi Reddy (S). **Lead, cadmium and chromium levels in vegetables grown in urban sewage sludge - Hyderabad, India.** *Food Chemistry* 40(2); 1991: 229-234

Spinach, amaranthus and cabbage cultivated in sites of river Musi in which the sewage load of Hyderabad city is channeled showed that all leafy vegetables have accumulated higher amounts of Pb, Cd and Cr when compared to those from unpolluted areas indicating possible health hazard for consumers. SD

Cauliflowers

576

Goyal (M) and Mathew (S). **Physico-chemical characteristics of cauliflower dried under different drying conditions.** *Indian Journal of Nutrition and Dietetics* 27(2); 1990: 39-46

Cauliflower was dried without blanching and also after blanching for 3 min in boiling water (4:1) followed by sulphiting for 10 min in 1.0% potassium metabisulphite solution. Drying was done (i) under open sunlight, (ii) shade and (iii) in solar drier. The max. temp. in drier ranged from 50 to 60 C (plus or minus 5 C) during the winter season. The max. winter temp. under open sunlight and shade ranged from 22.2 to 25.8 C and 15 - 18 C resp. The max.

and min. rh during the drying period was 77 to 97% and 14 to 40% resp. Dried samples were analysed for proximate comp., ascorbic acid, water soluble sugar, tryptophan, Fe, P, Na, K and Ca contents. Blanching caused 32.0% loss in ascorbic acid and 13.9% loss of water soluble sugar. Blanching and drying methods did not significantly change the total ash, crude fibre, crude protein, crude fat and total carbohydrate and energy content of cauliflower. Shade dried cauliflower retained significantly higher amount of tryptophan than the open sun-dried and solar dried cauliflower. Unblanched samples scored less in sensory evaluation. Solar dried cauliflower scored more than open sun-dried and shade dried counterparts. The dried samples when packed in polyethylene bags and stored at room temp. for 12 months caused significant reduction in acceptability scores. The reduction was greater in unblanched cauliflower. It is concluded that blanching followed by solar drying gives good product with high nutritional quality. GS

Kenaf

577

More (DR), Pawar (VD), Deshpande (HW) and Nimkar (DJ). **Studies on selected functional properties of defatted whole and processed kenaf (*Hibiscus cannabinus* L.) seed flour.** *Journal of Food Science and Technology (India)* 29(1); 1992: 17-21

Selected functional properties of defatted whole and processed kenaf seed flour were studied. The dehulled flour contained highest protein (39.8%), lowest fibre (3.3%) and phytic acid (3.04%) compared to flours of cake and whole seed. The dehulled flour exhibited strikingly better functional properties and was comparable with those of soybean. The removal of seed coat fractions including fibre and phytic acid in dehulled flour improved the functional properties. The dehulled expeller press cake flour although showed improvements in some functional properties than whole flours, it was poor in nitrogen solubility, foaming and emulsion properties due to heat denaturation of proteins. AS

Leafy vegetables

Asparagus

578

Gairepy (Y), Raghavan (GSV), Castaigne (F), Arul (J) and Willemot (C). **Precooling and modified atmosphere storage of green asparagus.** *Journal of Food Processing Preservation* 15(3); 1991: 215-224

Effect of 3 precooling techniques, storage at 1.5 C under normal atm. with different rh and 3 different modified atm. (MA) storage on green asparagus revealed that precooling before storage reduced more than 20% losses, MA storage retained better colour, fresher appearance, firmer texture and less than 12% mass loss. In MA storage, silicon membrane adequately controlled CO₂ but to prevent anaerobic respiration O₂ was injected regularly. SD

Lettuce

579

Chikkasubbanna (V), Shankargowda Patil (KV), Jayaprasad and Poonacha (NM). **Effect of prepackaging and preharvest sprays of triacontanol on the storage life of lettuce (*Lactuca sativa* L.) cv. Great lakes.** *Indian Food Packer* 45(2): 1991; 45-51

Field grown lettuce were sprayed with triacontanol 0, 2, 4 and 6 p.p.m. once and twice with 15 and 30 days interval. After harvest they were packed in polyethylene bags of 100 gauge thickness and 45 cm x 32 cm size with ventilation of 0.20%. The packs were kept at 15.42 - 27.3 C for 8 days and observation were made for physiological loss in wt., ascorbic acid content, spoilage % and wilting. Prepackaging in sealed and perforated polyethylene bags reduced physiological loss in wt. by 0.3% to 3.06% and retained ascorbic acid in polyethylene bags with and without vent 43.01% and 38.57%, resp. Bacterial decay was observed in lettuce heads packed in polyethylene bags from 5th day of storage, and this decay was more in 0.20% ventilation. Triacontanol sprays slightly reduced the spoilage due to decay. In unwrapped lettuce wilting was observed instead of decay. The storage life of lettuce heads was only one day in unwrapped, whereas it was 7.08 and 6.50 days in those wrapped in polyethylene bags without vents and with 0.20% ventilation, resp. The interaction effect of prepackaging and triacontanol sprays was not significant. VKR

Tomatoes

580

Porretta (S). **Nonenzymatic browning of tomato products.** *Food Chemistry* 40(3): 1991; 323-335

Galacturonic acid, slowed down browning reactions by which it is possible to differentiate tomato products prepared by hot-break and cold-break technique with regard to non-enzymatic browning. SD

581

Sandhu (KS), Cheema (DS) and Surjan Singh. **Studies on the varietal differences in physico-chemical characteristics of some tomato varieties.** *Beverage and Food World* 17(1): 1990; 34-35

The selected 8 var. Ohio 7663, Rouita, Roma, EC 119190, EC 119197, EC 119192, EC 119193 and Pb-chhuhara) of tomato for marketable yield, physical characters and proximate comp. has been evaluated. They ranged between 106.21 to 284.08 quintals/hectare. The fruits of all var. were medium sized and deep red in colour. The juice recovered varied between 79.23 to 85.94%. The juice was bright red in colour. The chem. comp. of juice was total solids 4.93 - 5.83%, total soluble solids 4.5 - 5.0%, acidity 0.46 - 0.53%, ascorbic acid 10.20 - 17.82 mg, sugars - reducing 2.04 - 2.71% and total 2.19 - 2.73%; Pb-chhuhara was adjusted best for processing followed by EC 119197 among these varieties. SRA

Tomato juices

582

Efluvwevwere (BJO) and Eka (AE). **Shelf and microbiological stability of acidified noninoculated and inoculated (*Alternaria tenuis*) tomato juice.** *Journal of Food Processing Preservation* 15(3): 1991; 159-165

Pasteurized tomato juice, control (C, initial pH 4.55) acidified-noninoculated (T₁) and acidified-inoculated (T₂) (both initial pH 4.00) were stored at 29 plus or minus 2 C for 28 days. T₁ and C attained appreciable microbial population, log₁₀ 7.5 and 6.9 cfu mL⁻¹ resp. and with similar trends in lactobacilli. Yeast count increased in all samples and in T₂ alternaria count and pH increased and total soluble solids decreased. The occurrence of mycelial mat and settling out of insoluble suspended solids in T₂ by day 16 was not noticed in C and T₁. SD

FRUITS

583

Whitefield (FB), Ly Nguyen (TH) and Last (JH). **Effect of relative humidity and chlorophenol content on the fungal conversion of chlorophenols to chloroanisoles in fibreboard cartons containing dried fruit.** *Journal of the Science of Food and Agriculture* 54(4): 1991; 595-604

The fungal conversion of 2, 4, 6-trichlorophenol, 2, 3, 4, 6-tetrachlorophenol and pentachlorophenol to the corresponding chloroanisoles in fibreboard

cartons was studied under temp. and rh similar to those that could occur in shipping containers during transportation of packaged dried fruit (sultanas). Dried fruits were packed in cartons manufactured from virgin kraft fibreboard (total chlorophenol content $66 \mu\text{g kg}^{-1}$) and fibreboard prepared from recycled waste paper (total chlorophenol content $1375 \mu\text{g kg}^{-1}$). Use of virgin fibre board ensured that the contamination of the fruit with chloroanisoles remains below their flavour threshold concn., by reducing the concn. of the precursor compounds. At 92% rh the concn. of trichloroanisole fruit packaged in virgin fibreboard was only half that necessary to cause the off-flavour. Thus, the concn. of the chloroanisoles in the packaged fruit increased with increasing rh. BV

584

Alna (JO) and Adesina (AA). **Quality attributes of jams from low-usage tropical fruits.** *Food Chemistry* 40(3): 1991: 345-351

High-solids jams prepared from African Star apple (*Chrysophyllum albidum*) and African plum (*Spondias mombin*) by open-kettle process showed fruit contents (43 - 45%), soluble solids (68.6 - 68.9%) reducing sugar (35.6 - 40.6%) and pH (2.80 - 3.40) being within comparable range. Jams showed storage stability at ambient conditions and sensory evaluation indicated preference to apple jams compared to the plum jams. SD

Apples

585

Chai (Y-L), Ott (DB) and Cash (JN). **Shelf-life extension of Michigan apples using sucrose polyester.** *Journal of Food Processing Preservation* 15(3): 1991: 197-214

The influence of SemperfreshTM (sucrose polyester) during cold storage of 'Golden Delicious', 'Ida Red' and 'McIntosh' apples showed retarded ripening with persistence green colour, increased tissue firmness and titratable acidity and comparable soluble solids. 'Golden Delicious' and 'McIntosh' apples showed better storage quality than 'Ida Red' apples. SD

586

Tsantili (E) and Knee (M). **Ripening of globster 69 apples after low-ethylene storage.** *Journal of the Science of Food and Agriculture* 54(4): 1991: 579-586

Apples were stored for upto 200 days in 2 kPa O_2 at 1.5 °C with continuous ethylene removal. Fruits retained the ability to ripen normally after prolonged storage. synthesis of the aroma volatiles, 2 methyl

butyl acetate and hexyl acetate remained unimproved. Aroma synthesis, softening and pectin solubility required high ethylene levels for initiation, whereas losses of starch malate and chlorophyll occurred in untreated apples and were only accelerated by ethylene. Sugar changes seemed to be independent of ethylene. GS

587

Joshi (VK), Lal (BB) and Kakkar (KS). **Updating the technique of apple chops making and its utilisation.** *Beverage and Food World* 17(1): 1990: 21-22

Apple chops prepared from two var. were dipped in sulphur dioxide solution (2000 p.p.m.) for 60 min. or by sulphuring at 5 g/kg for 45 min. The products prepared from these treatments showed a shelf-life of 1 yr. The chops from 'Red-gold' apple var. showed higher nonenzymatic browning compared to those from 'Golden Delicious' apples. Samples treated with 1000 p.p.m. sulphur dioxide and in untreated ones, were found to be infested with almond moth (*Ephestia cautella*) after 2 month of storage. Chops could be used as snacks or converted into jam of acceptable sensory quality by the method reported in the paper. SRA

Apricots

588

Sharma (TR), Sekhon (KS) and Saini (SPS). **Studies on canning of apricot.** *Journal of Food Science and Technology (India)* 29(1): 1992: 22-25

Drained wt. in canned apricot increased with storage and had an inverse relationship with cut-out syrup. Varieties and treatments had their pronounced effects on drained wt. and texture. Acidification and addition of calcium chloride had a stabilizing effect on ascorbic acid content. Inclusion of calcium chloride in covering syrup greatly improved the texture and sensory scores. Var. suitable for canning are in the order of : 'Kaisha', 'Charmaghz', 'Suffaida' and 'Chuli', - the last one a wild var. had the max. acidity and was found unsuitable for canning due to its textural unstability. AS

Avocados

589

Lozano (YF), Ratovohery (JV) and Gaydou (EM). **Compositional changes in triglycerides of avocado mesocarp associated with fruit development.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 46-52

Changes in triglyceride comp. of avocado (*Persea americana*) oil samples were followed during fruit development. Four stages of development were selected. The var. studied (Lula, Bacon, Fuerte, Zutano) were grown under mediterranean-like agroclimatic conditions. Intercorrelation among individual triglycerides (TG) was identified, and their relation to var. and stage of development were observed by analysing the data from 154 samples of avocado fruits with factorial discriminant analysis (FDA). This statistical technique showed a good partition of samples among the different stages examined. The first axis of FDA represented the maturity index for all var. For the same stage of development, the differentiation of var. is less precise with such a statistical technique. Nevertheless, the power of this technique based on the analysis of the TG was sufficient to lead to a correct classification for one stage. For the others, some misclassification occurred. Among the variables investigated only seven triglycerides remained essential. AS

Grapes

590

Dhillon (PS) and Sandhu (SS). **Effect of packaging treatments and SO₂ generator on the post-harvest losses of Perlette grapes.** *Indian Horticulture* 47(4): 1990; 376-381

Perlette grapes harvested in June 1986 were enclosed in polyliners having 0.58, 0.84, 1.12, 1.40 and 1.68% perforation. The field harvested grapes was packaged at 35 C. (field temp.) 30, 25, 15 and 5 C. Quarter size 'Dual release' SO₂ generator paper was placed in each polyliner. The polyliners and corrugated fiber board (CFB) cartons were kept in cold storage (0.3 C temp. and 85 - 90% rh) for 60 days. The sensory rating was highest for those packaged at 15 to 35 C with 1.12% perforation in the polyliner. The Brix⁰; acid ratio was also higher in those packaged at 35 C than at lower temp. The physiological wt. loss, berry shatter and rot were min. in 5 C packaging temp. and 0.56% perforation. Perlette grapes can be successfully stored upto 40 days by enclosing quarter size, 'Dual release' SO₂ generator in the polyliner having 1.12% perforation and packing at 35 C in the vented CFB. SRA

Jack fruit

591

Annapurna (SS), Ramadoss (CS) and Siva Prasad (D). **Characterisation of a trypsin/chymotrypsin inhibitor from jack fruit (*Artocarpus integrifolia*) seeds.** *Journal of the Science of Food and Agriculture* 54(4): 1991; 605-618

Jack fruit seed (*Artocarpus integrifolia* Hook f) trypsin inhibitor (JSTI) was found to be rich in acidic amino acids and devoid of free thiol groups. The N-terminal and C-terminal amino acids of JSTI were aspartic acid and serine, resp. The inhibitor was stable under conditions of extremes of pH (3.0 - 12.0), at high temp. and in the presence of denaturing agents. JSTI showed a non-competitive type of inhibition with K_i values of 0.48 plus or minus 0.17 nM and 0.16 plus or minus 0.04 nM for trypsin and chymotrypsin resp. The JSTI trypsin complex exhibited chymotrypsin inhibitory activity suggesting the 'double-headed' nature of the inhibitor. Chemical modification of lysine residues resulted in loss of trypsin and chymotrypsin inhibitory activities of JSTI indicating that amino groups are essential for activity. AS

Longan fruit

592

Bhattacharyya (AK), Liaquat Ali (S) and Mazumdar (BC). **Qualitative constituents of longan (*Euphoria longan* Steud) fruits during their developmental stages.** *Andhra Agricultural Journal* 37(2): 1990; 192-194

Lychee

593

Lee (HS) and Wicker (L). **Quantitative changes in anthocyanin pigments of lychee fruit during refrigerated storage.** *Food Chemistry* 40(3): 1991; 263-270

Mangoes

594

Ethiraj (S) and Suresh (ER). **Studies on the utilisation of mango processing wastes for production of vinegar.** *Journal of Food Science and Technology (India)* 29(1): 1992; 48-50

The possibilities of utilizing mango peels and stones for production of vinegar were explored. Direct fermentation yielded slightly more alcohol as compared to fermentation of cold or hot water extracts. Since the alcohol content in the base wine was less (2.5 to 3.5%) for vinegar production, it was raised to 5% either by fortification with alcohol or by secondary fermentation by addition of cane sugar. A good quality vinegar with 4.5 to 5.0% acetic acid and characterised by mild mango flavour was obtained. The simple batch type process required 3 to 12 days for completion depending upon the base wine. AS

595

Sanyal (D), Roychoudhury (R), Dhua (RS) and Mitra (SK). **Study of some mango cultivars of West Bengal.** *Indian Food Packer* 45(2): 1991: 29-33

Investigation carried out to evaluate the suitability of mango (*Mangifera indica* L.) cv. ('Bangalora', 'Biswanath Chatterjee', 'Biswanath Mukherjee', 'Dashehari', 'Jehanara', 'Khasulkhas', 'Kohitoor', 'Krishnabhog', 'Langra Banarasi', 'Samar Bahist Chausa', 'Totapuri Red Small' and 'Zardalu') grown in the alluvial plains of West Bengal, India for processing indicated that 'Kohitoor' was superior to other cv. in fruit wt. (528.0 g), size and pulp wt. (413.0 g). Pulp recovery was highest in cv. 'Biswanath Mukherjee' (80.53%), and it was also lowest in peel (7.16%) and in stone (12.31%). 'Dashehari' fruit quality was superior to others with lowest moisture (76.2%) content. 'Langra Banarasi' contained max. ascorbic acid (42.5 mg/100 g of pulp) while 'Zardalu' and 'Biswanath Chatterjee' were rich in total phenol (7.83%) and β -carotene contents (20, 750 μ g/100 g). VKR

Papayas

596

Seplah (M), Subki (A) and Lam (PF). **Fungicides for postharvest control of *Colletotrichum* spp. in eksotika papaya.** *ASEAN Food Journal* 6(1): 1991: 14-18

Two species of *Colletotrichum* were isolated from the fruit spots of eksotika papaya. *C. capsici* was found on 96% of infected fruit while *C. gloeosporioides* was found on 7% other fungi isolated less frequently were *Alternaria alternata*, *Botryodiplodia theobromae*, *Fusarium solani*, *Gibbertella pericarpa*, *Phomopsis Caricae papayae*, *Cladosporium oxysporum* and *Ceratocystis paradoxa*. The effect of fungicides on radial growth indicated that prochloraz was superior to other fungicides (benomyl, carbendazim, chlorothalonil, propiconazole, thiabendazole) in inhibiting growth of both species of the *Colletotrichum*. The fruit spoilage by pathogens was effectively controlled by prochloraz and propiconazole. SRA

Sapota

597

Gautam (SK) and Chundawat (BS). **Effect of post-harvest treatments on biochemical changes in sapota cv, 'cricket ball'.** *Journal of Food Science and Technology (India)* 29(1): 1992: 53-54

Treatments with gibberellic acid 300 p.p.m., kinetin 100 p.p.m. and silver nitrate 40 p.p.m. slowed down

ripening by retarding the pre-climacteric respiration rate and ethylene production and through postponement of their activity peaks. These changes lead to reduced degradative metabolism in terms of catalase and PME activities and thus helpful in extending shelf-life of sapota fruits. AS

598

Gautam (SK) and Chundawat (BS). **Post-harvest changes in sapota cv. 'Kalipatti'. II. Effect of various post-harvest treatments on physico-chemical attributes.** *Indian Journal of Horticulture* 47(3): 1990: 264-269

Sapota (*Achras sapota*) var. 'Kalipatti' after harvest was treated with gibberellic acid (GA, 300 p.p.m.) for 20 min (T₁), kinetin (100 p.p.m.) dip for 20 min (T₂) and silver nitrate (40 p.p.m.) dip for 20 min (T₃) to extend the shelf-life and the treated fruits were ripened at ambient (28.2 - 39.2 C) temp. and 72 - 100% rh. Fruits treated with T₁ took max. 7.7 days to ripen followed by T₂ (6.7 days) and T₃ (6.2 days). Physiological loss in wt. was min. in T₂, the titratable acidity declined slowly during the ripening period being most rapid in T₁; the ascorbic acid declined slower in T₂ and T₃; the starch level was max. in T₂ indicating delayed ripening by kinetin treatment. Total sugar content was highest in T₂ followed by T₁. The pigment content increased rapidly in control attaining max. value in 96 h after harvest compared to 144 h in treated fruits (T₁, T₂ and T₃). Carotenoid content was max. in T₁ followed by T₃ and T₂. Among the three treatments dip in 300 p.p.m. GA was most effective. SRA

CONFECTIONERY, STARCH AND SUGAR

599

Kapil (V), Dodeja (AK) and Sarma (SC). **Lactose manufacture - a review.** *Indian Food Packer* 45(2): 1991: 52-62

The process involved in the manufacture of lactose: types of whey suitable for lactose manufacture; de-proteinization of whey; concn. of whey in conventional evaporators and by reverse osmosis, crystallization, and harvesting of lactose crystals; refining methods, yield and purity have been reviewed. 62 references. VKR

Confectionery

600

Jackson (EB). **The importance of sweeteners in confectionery production.** *Confectionery Production* 57(4): 1991: 300-301

The author highlights the production of hydrogenated sweeteners (sorbitol and maltitol) and their application in chocolate and sugarless confectionery. BV

601

Lees (R). **Fundamental principles in the production and characteristics of confectionery foam products. Part II. Confectionery Production** 57(4): 1991: 308-309

Starch

602

Marousis (SN), Karathanos (VT) and Saravacos (GD). **Effect of physical structure of starch materials on water diffusivity. Journal of Food Processing Preservation** 15(3): 1991: 183-195

Physical structures, created with hydrated granular/gelatinized starches and their mixtures with sugars/inert particles during air drying, were characterized by bulk porosity (estimated from the bulk and solid densities of samples) which influenced the water diffusivity. The water diffusivity in granular starches was reduced by mechanical compression, starch gelatinization/addition of water-soluble sugars inert particles/extrusion cooking caused higher water diffusivities due to higher porosities of starch/inert mixtures or expanded extrudates. SD

603

Sievert (D), Czuchajowska (Z) and Pomeranz (Y). **Enzyme-resistant starch. III. X-ray diffraction of autoclaved amylo maize VII starch and enzyme-resistant starch residues. Cereal Chemistry** 68(1): 1991: 86-91

X-ray diffraction was used to follow the development of crystallinity in amylo maize VII starch samples after repeated cycles of autoclaving and cooling. Changes in crystallinity were revealed by the development of reflections at 0.529 and 0.398 nm. Reduced intensities of a peak at 0.440 nm, which likely reflected the V pattern of complexed amylose, suggested that amylose-lipid complexes melted out during repeated autoclaving and cooling. Diffractograms of enzyme-resistant starch (RS) residues, isolated from amylo maize starch samples by treatment with Termamyl and amyloglucosidase, displayed single peaks at 1.662 and broad diffraction lines at 0.537 and 0.398 nm. The patterns suggested that chain fragments, packed in a B-type crystalline structure with a slightly enlarged crystal lattice, contribute to formation of RS from amylo maize starch. Structures resistant to enzymatic hydrolysis, as assessed by X-ray and differential scanning calorimetry measurements,

differed in crystallinity and resistance to thermal dissociation depending on the treatment of amylo maize starch. Differences in association between the chain fragments, presumably originating from amylose and varying proportions of interspersed, less-ordered segments, were assumed to account for these findings. Conditions applied for preparation of RS, such as type of amylo lytic enzyme used in the isolation procedure, also affected thermal and crystallographic properties of RS. AS

BAKERY PRODUCTS

Bread

604

Addo (K), Pomeranz (Y), Huang (ML), Rubenthaler (GL) and Jeffers (HC). **Steamed bread. II. Role of protein content and strength. Cereal Chemistry** 68(1): 1991: 39-42

Twenty-nine hard wheat flours ranging in protein content from 9.3 to 14.4% and in specific pan bread volume ($\text{cm}^3/1\%$ protein) from 9.8 to 54.1 cm^3 and 34 soft wheat flours with protein content from 6.7 to 15.5% and specific pan bread volume from 14.9 to 74.1 cm^3 were compared in making pan bread and steamed bread under optimized conditions. Included in the evaluation were water absorption, mixing time, four alveograph parameters, and bread scores. Protein content was important in production of acceptable steamed bread (especially from low-protein soft wheat flours). High flour strength (as determined by physical dough tests) was desirable in production of pan bread (especially from high-protein hard wheat flours) and detrimental in production of steamed bread. A model using alveograph parameters and protein predicted 82.1% of the variability in pan bread volume potential of bread baked from hard wheat flours. Only 44.0% of the variability in steamed bread volume potential could be predicted from the protein content of soft wheat flours. AS

605

Yousif (AK), Morton (ID) and Mustafa (AI). **Functionality of date paste in breadmaking. Cereal Chemistry** 68(1): 1991: 43-47

Partial replacement of wheat flour with date paste (4 - 8%) modified bread dough as indicated by farinograph and alveograph studies. Addition of date paste decreased the malt index and delayed gelatinization. Total gas production and retention were improved by 4 - 6% addition compared with the sugar-free control. A higher concn. (12%) of date paste resulted in a negative effect on the gassing and handling properties of the bread dough. A good

quality bread with improved external and internal characteristics could be produced by a partial replacement of the wheat flour with 4% date paste. Increasing the date paste replacement level had an adverse effect on the crust and crumb colour of the bread produced, as shown by the scores for the bread supplemented with 8 and 12% date paste. Addition of 4 - 8% date paste as a wheat flour replacement to the bread formula significantly retarded firming of the bread crumb after two days' storage. Date paste also prolonged the shelf-life of breads. AS

606

Neyreneuf (O) and Plaat (JBVD). **Preparation of frozen French bread dough with improved stability.** *Cereal Chemistry* 68(1): 1991: 60-66

Optimizing the properties of French bread dough through prolonged frozen storage is difficult because the dough is prepared from a simple recipe to which few additives are permitted. The parameters that directly influence the properties of such doughs was analyzed. At the formulation stage, a specific compressed yeast with "reduced activity" was found to contribute greatly to dough stability. This benefit was largely lost when this yeast was converted to different instant-dry forms. An adequate protein content in the bread flour and a carefully formulated bread improver were shown to be important in optimizing the gas retention properties of frozen doughs. At the mixing stage, conditions that gave full dough development without inducing the start of gas production by the yeast improved dough stability. The addition of prefermented doughs was contraindicated, whereas delayed incorporation of the yeast and a relatively low dough temp. were shown to be advantageous. An outline production process incorporating the positive findings is presented. AS

607

Berglund (PT), Shelton (DR) and Freeman (TP). **Frozen bread dough ultrastructure as affected by duration of frozen storage and freeze-thaw cycles.** *Cereal Chemistry* 68(1): 1991: 105-107

Cryogenic preparation of frozen bread dough permitted examination of changes in ultrastructure by low-temp. scanning electron microscopy (SEM). Doughs examined after mixing and frozen doughs, thawed during SEM preparation, exhibited a reticular pattern. After mixing and 24 h frozen storage, starch granules appeared firmly embedded in the gluten network, which was mostly intact. Some starch granules exhibited internal damage and were more separated from the gluten matrix after 24 wks of frozen storage and freeze-thaw cycles. When doughs were kept frozen during SEM

preparation, the reticular pattern was not apparent. After 24 wks frozen storage and freeze-thaw cycles, doughs that were kept frozen during SEM preparation had less free water distributed throughout the sample. In these doughs, less water appeared to be associated with the gluten matrix and starch. Patches of ice were observed in samples kept frozen during SEM preparation. The observed changes in ultrastructure may help explain the extended proof times and reduced loaf volumes of frozen bread dough. AS

608

Sanders (SW). **Using prune juice concentrate in whole wheat bread and other bakery products.** *Cereal Foods World* 36(3): 1991: 280-281, 283

Prune juice conc. can serve as a natural preservative in yeast-leavened baked products. With its other attributes of natural colour, dough strengthening, flavour enhancement, sweetening and humectancy it could be considered as a multi-purpose ingredient in foods. BV

Cakes

609

Lee (CC), Johnson (LA), Love (JA) and Johnson (S). **Effects of processing and usage level on performance of bovine plasma as an egg white substitute in cakes.** *Cereal Chemistry* 68(1): 1991: 100-104

The effects of processing and level used on the performance of bovine plasma replacing egg whites in cakes were investigated. Plasma was evaluated in high-ratio, white layer cakes in different forms (fresh, frozen and spray-dried) at 5 levels (50, 75, 90, 100 and 110% of the normal protein level when using egg whites). An enzyme-hydrolyzed 90/10 blend of plasma and beef stock was also evaluated. Cakes made with plasma had slightly less vol., less crowning profile, and darker crust colour than cakes made with equivalent amounts of egg white protein. Also, those cakes were softer, less chewy and less springy but were similar in cohesiveness and gumminess to those made with egg whites. Nearly equivalent performance was achieved by replacing 1.0 parts of egg whites with 1.1 parts of plasma. There were few differences in performance among fresh, frozen, and spray-dried plasma. Hydrolyzed plasma-beef stock blends gave cakes with higher vol. but darker crust colours than plasma. AS

Collar (C), Mascaros (AF), Prieto (JA) and de Barber (CB). **Changes in free amino acids during fermentation of wheat doughs started with pure culture of lactic acid bacteria.** *Cereal Chemistry* 68(1); 1991; 66-72

Dynamics of free amino acid levels during fermentation of wheat bread doughs started with 3 strains of lactic acid bacteria species - *Lactobacillus brevis* (B33), *L. plantarum* (B39), and *Enterococcus faecium* (B40) - were investigated by reversed-phase HPLC of the dansyl amino acids. 20 protein amino acids, γ -aminobutyric acid, and ornithine were quantified in doughs fermented 0, 4, and 24 h with lactic acid bacteria. Changes were related to the nutritional requirements proteolytic activities developed by these microorganisms. Nutritional requirements of lactobacilli and enterococcus for glycine were evidenced at the beginning of fermentation (0 - 4 h), whereas asparagine was consumed later (4 - 24 h). In addition, B33 metabolized glutamine and serine first, and aspartic acid, glutamic acid, γ -aminobutyric acid, tryptophan, and proline later; alanine was assimilated during the entire fermentation (0 - 24 h). B39 showed preferential uptake of aspartic and glutamic acids, glutamine, serine, alanine, ornithine and threonine. Exoproteolytic activity of microorganisms was revealed by the rise in levels of some protein amino acids. During fermentation (0 - 24 h), valine, leucine and lysine gradually increased; however, in all doughs proline content increased only during the first 4 h. Aspartic acid and histidine were accumulated only in doughs fermented with B40. Methionine and tryptophan accumulated in doughs fermented with B39 and B40. The degree and rate of proteolysis during fermentation were higher for bread doughs containing B40. For the strains of lactic acid bacteria considered, changes in γ -aminobutyric acid were connected to changes in glutamic acid. Higher amounts of ornithine in doughs fermented long times were presumably due to its release by microorganisms. AS

Brummer (JM). **Modern equipment for sourdough production.** *Cereal Foods World* 36(3); 1991; 305-308

This feature article deals with descriptions of the equipment used in small and large scale bakeries, economic information of sour sough production equipment, recommended formulation and sour dough starters. BV

Brummer (JM) and Lorenz (K). **European developments in wheat sourdoughs.** *Cereal Foods World* 36(3); 1991; 310-312, 314

The changes in wheat sour dough prepared with different absorption, dough temp., type and amount of culture were studied. High absorption, high dough temp. and intermediate amount of culture and use of 7.5 to 10.0% of the wheat flour in the sourdough will produce a pleasantly aromatic wheat bread. BV

Tortillas

Bello (AB), Serna-Saldivar (SO), Waniska (RD) and Rooney (LW). **Methods to prepare and evaluate wheat tortillas.** *Cereal Foods World* 36(3); 1991; 315, 317-318, 321-322

Laboratory procedures to prepare and evaluate hot-press wheat tortillas were developed. Equipment conditions and quality parameters at each stage of processing were optimized. Water absorption and mixing time of tortilla dough were determined with a farinograph using about 54% water absorption and centering the curve at 750 FU. A pliable dough with good machinability resulted. Shortening decreased the water absorption and increased the mixing time of tortilla dough. Optimum resting time for tortilla dough balls was 20 min at 60 - 70% rh and 32 C. Shorter resting times yielded underbaked tortillas with small diameter and roughened surfaces, while longer resting times yielded irregularly shaped tortillas. Hot-press platen temp. of 218 C (top) and 204 C (bottom) and a 1.8 mm gap yielded uniformly shaped tortillas. Tortillas with good appearance were obtained when raw tortilla discs were baked at 232 - 271 C for 40 s. Tortillas were cooled to <30 C before packaging to prevent the tortillas from sticking together and to limit moisture condensation inside the package. Baked tortillas containing 11 - 13% shortening, 1.0 - 2.0% baking powder, and 1.5% salt were uniformly puffed and layered. Chemical, physical and textural properties of these tortillas were similar to those of commercial wheat tortillas. AS

MILK AND DAIRY PRODUCTS

Maubois (JL). **New applications of membrane technology in the dairy industry.** *Australian Journal of Dairy Technology* 46(2); 1991; 91-95

This review article considers recent improvements in microfiltration membranes applications in such as microbial purification of milk by tangential microfiltration, standardisation of proteins in milk with ultrafiltration or microfiltration, use of membranes in cheese technology, milk fractionation and membrane fermentation reactors. 25 references. BV

Milk

615

Zmarlicki (S), Yuan (TCJ) and Richardson (GH). **Improved estimations of total and psychrotrophic microflora in raw milk using reflectance colorimetry at 32 C.** *Journal of Food Safety* 11(3): 1991: 189-196

A reflectance colorimeter with 32 C incubation/detection temp. successfully quantitated total and psychrotrophic microflora in raw milk. Correlations between reflectance colorimetry and the Standard Plate Count improved with preliminary incubation time: .50 (no preliminary incubation), .74 (24 h at 7 C), to .84 (48 h at 7 C). Correlations between reflectance colorimetry and the Psychrotrophic Bacterial Count were better than those achieved with the Standard Plate Count and improved: .53 (no preliminary incubation), .80 (24 h at 7 C), to .91 (48 h at 7 C). The 48 h to 72 h preliminary incubation method would cost less and data would be available in 48 to 72 h compared to the 98 to 240 h for psychrotrophic plating methods. A second sample set (no preliminary incubation) could be analyzed to identify high-count samples in less than 24 h. Colour detection times following sample refrigeration for 24 h at 0, 4 and 7 C were significantly different from samples tested before refrigeration. Identical sample time/temp. storage conditions are suggested. AS

616

Reddy (KK), Nguyen (MH), Kallasapathy (K) and Zadow (JG). **The effect of some treatments and storage temperatures on UHT whole milk.** *Australian Journal of Dairy Technology* 46(2): 1991: 57-63

The evaluation of the effects of low-temp. inactivation (LTI) treatment and addition of sodium hexametaphosphate (SHMP 0.1%) to raw milk with higher bacterial count has been done. The quality of aseptically processed and packaged milk at three temp. of storage i.e. room (20 - 22 C), 37 C and refrigerated (4 - 6 C) for a period of 6 months was also studied. The lipolytic and proteolytic activities in the milk during storage were also observed. LTI treatment is effective in inactivating the enzymes as

observed by reduced free fatty acid content and proteolysis. Higher temp. of storage are not ideal for the shelf-life of UHT milk. GS

617

Dharampal. **Technological innovations in the manufacture of special milks.** *Beverage and Food World* 17(1): 1990: 13-16

The technological aspects and advantages in manufacture of special milks such as dietetic milks, cost, scarcity, utilisation of by-products, diversification of market milk industry, classification of special milks (plain special milk, reconstituted milks, toned milks, recombined milks), flavoured milks (artificially flavoured, chocolate flavoured, chocolate and fruit flavoured milks and milk beverages), vegetable solids-based milks (filled milk, imitation milk and soy milk) have been discussed. SRA

Milk products

618

Oakenfull (DG), Pearce (RJ) and Sidhu (GS). **Low-cholesterol dairy products.** *Australian Journal of Dairy Technology* 46(2): 1991: 110-112

Describes a process (SIDO AKTM process) developed by CSIRO Australia for producing low-cholesterol dairy products of cheaper and better quality. Covers the SIDO AKTM process, principle of operation, advantages of the SIDO AKTM process and safety and regulatory status of β -cyclodextrin. GS

Burfi

619

Patil (GR), Patel (AA), Garg (FC) and Rajorhia (GS). **Instrumental characterization of burfi texture.** *Australian Journal of Dairy Technology* 46(2): 1991: 64-68

Texture of burfi (soft or pistachio, and hard or plain), an Indian whole milk-based sweet, was measured by the Instron machine using different test conditions and the instrumental data compared with sensory texture descriptors. Soft burfi was typically moderate in firmness, high in crumbliness and low in elasticity, chewiness and smoothness, whereas hard burfi was markedly more firm, more crumbly and less sticky. Sensory firmness was corroborated by Instron hardness and deformation energy, and stickiness by adhesive force. Instron test conditions, viz., the degree of compression and, to a lesser extent, the speed of compression significantly influenced the texture profile parameters of both types of burfi. Hardness, deformation energy,

gumminess, chewiness, adhesive force and permanent area change increased as the degree of compression increased but the degree of elasticity decreased with increasing compression. Recoverable energy and cohesiveness first declined and then increased as compression progressed. Springiness of hard burfi generally showed a steady decline as the degree of compression increased, but that of soft burfi tended to increase, then decrease and finally increase again. The two types of burfi could be differentiated better when Instron measurements were carried out at higher (70 - 80%) compression using 20 mm.min⁻¹ speed. AS

Cheese

620

Esteban (MA), Marcos (A), Alcala (M) and Gomez (R). **Calculation of water activity in surface mould-ripened soft cheeses from their chemical composition.** *Food Chemistry* 40(2): 1991; 147-157

The following linear regression and multiple linear regression equations between salt (NaCl), ash and non-protein nitrogen (NPN) to a_w (av. of measurements by psychrometric, cryoscopic, dew-point hygrometric and isopiestic equilibration methods) $a_w = 0.9813 - 0.0045 [\text{NaCl}]$; $a_w = 0.9769 - 0.0019 [\text{ash}]$, $a_w = 0.9793 - 0.0101 [\text{NPN}]$; $a_w - 0.996 - 0.0029 [\text{ash}] - 0.0106 [\text{NPN}]$ can be used singly or in combination to predict the a_w of surface mould-ripened soft cheeses. SD

621

Gangopadhyay (SK) and Thakar (PN). **Milk coagulant retention in Mozzarella cheese and curd.** *Australian Journal of Dairy Technology* 46(2): 1991; 49-52

The detn. of the influence of various manufacturing parameters (draining acidity of whey, type of milk, temp. of moulding water used for plasticizing the curd; method of acidification and type of rennet) on the level of residual milk coagulant remaining in curd and in Mozzarella cheese from buffalo milk has been studied. The influence of such retention of coagulant on proteolysis of cheese during storage has also been studied. GS

622

Tukan (SK) and Humaid (MA). **Salt and moisture relationships in brined cheese.** *Australian Journal of Dairy Technology* 46(2): 1991; 85-87

Forty seven white brined cheese samples and their original brines representing Akkawi, Braided, Feta and Nabulsi cheese were analyzed for moisture and salt contents at equilibrium. Detailed chemical

analysis was also performed on eleven of these samples. Correlation was high ($P < 0.001$) between salt in brine and salt in cheese, and between salt in brine and moisture in cheese. Two useful regression equations were derived for the prediction of salt in cheese. The first employs salt concn. in brine and moisture in cheese whereas the second employs only salt concn. in brine. Results showed the possible applicability of the equations for different types of brined white cheese. It was demonstrated that detn. of salt in brine through analysis of sodium or chloride is suitable for the use of the equations, whereas methods depending on collective properties such as sp. gr. are not useful since brine contains other soluble substances. AS

Cheddar cheese

623

Kanawjia (SK) and Singh (S). **Factors affecting compositional quality of Cheddar cheese from buffalo milk.** *Journal of Food Science and Technology (India)* 29(1): 1992; 36-39

Among the casein/fat (C/F) ratios studied, 0.65 to 0.70 was found to be optimum to enhance the moisture retention in Cheddar cheese made from buffalo milk. The yield, moisture and total solids retention in cheese were higher as compared to those obtained from highest C/F ratio (0.75) milk. Max. yield, moisture retention and total solids recovery were obtained at a higher temp. of 165 F. Homogenization improved yield, moisture retention and recovery of total solids in cheese. Among the different additives, pectin gave a superior product. The yield and moisture retention were max. in pectin added cheese. AS

Cheese-whey

624

Leiras (MC), Chirife (J) and Alzamora (SM). **Development of a shelf-stable hydrolyzed concentrated cheese whey.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991; 12-16

Concentrated cheese whey (50% total solids) was enzymatically hydrolysed (about 65 - 70% lactose hydrolysis) and the resultant whey had a a_w of 0.90. Adjustment of pH to 5.0 together with the addition of 0.2% potassium sorbate or 0.2% calcium propionate (or 0.1% of each one) results in a whey which can be stored upto 3 months without refrigeration. Microbial evaluation showed that none of the microorganisms (*Staphylococcus*, yeasts and molds) inoculated were able to grow in any of the modified hydrolysed concentrated cheese whey samples after 3 months of incubation. BV

Mozzarella cheese

625

Thaker (DN), Gangopadhyay (SK) and Miyani (RV). **Influence of manufacturing parameters on rheology of Mozzarella cheese made from buffalo milk.** *Australian Journal of Dairy Technology* 46(2): 1991: 53-56

The rheological properties of buffalo milk Mozzarella cheese has been related to the manufacturing variables such as acidity of whey at draining, type of milk (raw or heated), plasticizing treatment of curd, method of milk acidification (starter or direct acidification) and type of rennet using an Instron compression test. GS

Chhana

626

Deasi (HK), Gupta (SK), Patil (GR) and Patel (AA). **Textural properties of market chhana.** *Journal of Food Science and Technology (India)* 29(1): 1992: 30-32

Instron hardness, cohesiveness, gumminess and chewiness varied significantly in chhana samples collected from different suppliers. Correspondingly, significant variations were also noted in sensory firmness, crumbliness, chewiness and smoothness. Chhana having sensorily most acceptable textural properties was fairly smooth but sticky, and low in firmness, elasticity, crumbliness and chewiness. Variations in textural characteristics appeared to be related, to some degree, to significant variations in pH, and to a lesser extent, to the moisture content. AS

627

Goyal (GK). **Influence of packaging and types of chhana on the water vapour transmission rate of flexible packages.** *Journal of Food Science and Technology (India)* 29(1): 1992: 55-56

Water vapour transmission rate (WVTR) of flexible packages increased with the increase in storage temp. The change in WVTR of the packages was significantly affected by the duration of storage and the type of chhana packaged. AS

Kheer

628

Niturkar (PD), Doke (VS), Joglekar (NV) and Rotte (SG). **Studies on the formulation and quality**

attributes of milk protein based vermicelli (Seviah) for Kheer-like product. *Journal of Food Science and Technology (India)* 29(1): 1992: 33-35

Studies on the formulation and evaluation of quality attributes of vermicelli with 2, 4 and 6% milk protein fortification in semolina and white flour were conducted. As the level of milk protein fortification was increased, the water required for dough formation got decreased and time for dough development and extrusion increased. Fortification of milk protein increased the vermicelli thread length with improvement in colour and texture. An improvement in sensory qualities of vermicelli was brought about with 4% milk protein fortification in either of the wheat flour fractions. Higher scores for sensory attributes including flavour, taste and acceptability were recorded. An increase in the protein level by 15.77 and 16.18% in semolina and white flour vermicelli at 6% milk protein fortification resulted in a decrease of 70.34 and 69.63% resp. in the total carbohydrate content. AS

Khoa

629

Sawhney (IK), Patil (GR) and Bikram Kumar. **Studies on water activity modification in heat concentrated whole milk product 'khoa' using propylene glycol.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 6-8

The effect of propylene glycol addition on moisture sorption isotherms of khoa was studied for propylene glycol concn. of 0, 2, 4, 6 and 8% wt./wt., wet basis. Experimental data on isotherms were fitted to a GAB model. At all water activity levels in the range of 0.6 - 0.97, the equilibrium moisture content of khoa increased with the increasing level of propylene glycol. The monolayer moisture content also increased on addition of propylene glycol. The mathematical relationships between GAB constants and propylene glycol concn. were established to predict water activity of khoa at a given concn. of propylene glycol. The effect of propylene glycol addition on Gibbs free energy change is discussed. AS

Milk powder

630

Singh (S) and Kanawjia (SK). **Effect of coagulation temperatures and total solid levels on quality of paneer made from whole milk powders.** *Journal of Food Science and Technology (India)* 29(1): 1992: 57-59

Whole milk powder was utilized to prepare paneer of acceptable quality, so that this acid coagulated milk product is available around the yr. Acceptable quality paneer was obtained from milk having 15% total solids and coagulated at 85 C. Experimental paneer compared well with the control. AS

Wheys

631

Dionysius (DA), Herse (JB) and Grieve (PA). **Extraction of lactoperoxidase and lactoferrin from whey using batch ion exchange techniques.** *Australian Journal of Dairy Technology* 46(2); 1991; 72-76

The extraction of lactoperoxidase and lactoferrin from whey using batch ion exchange chromatography was studied under various conditions. Maximal recovery of the two proteins from Cheddar cheese whey at pH 7 was achieved using CM-Sephadex resin with a 60-min binding time. Under these conditions almost 80% of the lactoperoxidase and greater than 90% of the lactoferrin present in the starting whey were recovered from the resin following desorption with NaCl. When the effects of whey pH, conductivity and type were studied, the following findings were observed: whey pH in the range 5 to 9 gave good recoveries of both lactoperoxidase and lactoferrin, but contaminating proteins bound at pH 5; whey conductivity significantly affected the adsorption of lactoperoxidase but not lactoferrin; and cheese whey (Cheddar and pizza) yielded better recoveries of lactoperoxidase than rennet and acid wheys, but lactoferrin recovery was largely unaffected by whey type. AS

632

Houlihan (AV) and Goddard (PA). **Analysis of a milk membrane fraction isolated from whey protein concentrates.** *Australian Journal of Dairy Technology* 46(2); 1991; 77-81

The protein and lipid comp. of lipoprotein complexes formed during the processing of whey protein conc. (WPC) have been analysed. WPC contains lipoprotein complexes of membrane origin i.e. from the skim milk membrane (SMM) system in which β -lactoglobulin and α -lactoglobulin have been incorporated during heat processing. GS

633

Pearce (RJ) and Marshall (SC). **New ways with whey components.** *Australian Journal of Dairy Technology* 46(2); 1991; 105-107

Information relating to use of whey components in foods; new ways of whey processing; role of microfiltration to reduce residual fat level in whey protein conc. and increase of protein levels and improvement in functional properties; and demineralisation techniques are discussed. BV

Milk proteins

634

Gothwal (PP) and Bhavadasan (MK). **Browning and aggregation of milk proteins.** *Journal of Food Science and Technology (India)* 29(1); 1992; 26-29

Heating of milk was found to change the separation pattern of casein through Sephadex G-200 gel chromatography. Generally, the proportion of high mol. wt. protein fraction increased with a concomitant decrease in low mol. wt. protein fraction on increasing the severity of heat treatment. The study showed that heating conditions which resulted in higher browning in milk would also lead, to increased polymerisation of proteins. Like browning, polymerisation of casein was considerably higher in buffalo milk than in cow milk under identical conditions of heating. Gel filtration studies showed that polymerisation of casein during heating of milk increases with increased levels of proteins or lactose or increase in pH. These factors also enhanced browning in milk. The extent of polymerisation of casein caused by these factors was higher in buffalo milk than in cow milk. AS

Caseins

635

Leitaer (E), Poiffait (A) and Adrian (J). **Studies on the interaction between casein and vitamin A.** *Lebensmittel-Wissenschaft und -Technologie* 24(1); 1991; 39-45 (Fr)

Casein forms all combine with retinol and retinal primarily through hydrophobic interaction due to the intermediary function of the aromatic amino acids. However, about 13% of the vitamin A is chemically bound to the casein. This bond is broken following saponification. AS

MEAT AND POULTRY

636

Fung (DYC) and Liang (C). **Critical review of isolation, detection and identification of yeasts from meat products.** *CRC Critical Reviews in Food Science and Nutrition* 29(5); 1990; 341-379

Meat

637

Prabhakar (K), Govindarajan (CV) and Shanmugam (AM). **A study on certain qualitative changes in glycerol, glycerol-nitrite and nitrite based intermediate moisture meats.** *Journal of Food Science and Technology (India)* 29(1): 1992: 62-64

Three types of intermediate moisture (IM) meats based on (i) glycerol (ii) glycerol-nitrite and (iii) nitrite were prepared by equilibration in their respective infusion solutions followed by oven heating and air-drying. Certain qualitative changes were studied in the IM samples during two-month ambient temp. storage along with frozen-stored unprocessed samples. Higher pH was noticed in nitrite and glycerol-nitrite based IM samples. Frozen-stored samples recorded a a_w of 0.98 compared to 0.85 in IM samples with non-significant changes during storage. Frozen stored samples and IM samples revealed total water of 73.98 and 41.10 to 43.91% before cooking and 60.51 and 57.12 to 57.17% after cooking and bound water of 43.28 and 30.29 to 34.76% before cooking and 48.76 and 46.05 to 46.61% after cooking resp. AS

638

Prabhakar (K), Govindarajan (CV), Kosalaraman (VR) and Shanmugam (AM). **Colour and related quality changes in intermediate moisture meats.** *Journal of Food Science and Technology (India)* 29(1): 1992: 65-67

Glycerol, glycerol-nitrite and nitrite based intermediate moisture (IM) meats were prepared by 24 h equilibration, oven-heating and air-drying to evaluate colour and related qualitative characteristics during storage at ambient temp. for 2 months in comparison to unprocessed frozen samples. Frozen stored samples recorded the lowest Munsell hue values (colour towards red hue). Glycerol and glycerol-nitrite based IM samples revealed higher hue values (19.57 and 19.0 resp.) indicating a change in sample colour towards yellow hue after processing. Munsell value was higher in the frozen-stored and glycerol-based IM samples than in glycerol-nitrite and nitrite based IM samples. Among cooked samples, hue was lower (towards red range) in nitrite based IM samples than others (towards yellow red range). Total pigment content and solubility in pyridine were highest in frozen stored samples followed by nitrite, glycerol-nitrite and glycerol based IM samples in that order. AS

639

Correia (LR) and Mittal (GS). **Gelation kinetics of meat emulsions containing various fillers during cooking.** *Journal of Food Process Engineering* 14(1): 1991: 35-49

A cylindrical shaped thermal scanning rigidity monitor (TSRM) was developed to determine shear rigidity modulus of meat batters during cooking. A meat fat-protein ratio of 1.8, moisture content of 62% and 8.6% filler were used. The fillers were buttermilk powder, corn starch, micro-crystalline cellulose, modified corn starch, modified wheat flour, soy-protein conc. and whey-protein conc. Plots of rigidity modulus versus product-temp. showed two major thermal transitions. The first and most important transition (53 to 61 °C) was due to myosin gelation. The second transition (64 to 69 °C) was ascribed to the collagen softening. The max. rigidity-temp. slopes of 0.60 to 1.02 kPa/°C occurred after the first transition. AS

640

Farmer (LJ) and Patterson (RLS). **Compounds contributing to meat flavour.** *Food Chemistry* 40(2): 1991: 201-205

641

Kim (H-J) and Taub (IA). **Specific degradation of myosin in meat by bromelain.** *Food Chemistry* 40(3): 1991: 337-343

Bromelain, an inexpensive enzyme was found more advantageous than papain to degrade myosin without affecting action in meat and useful for making good quality, shelf-stable, freeze-dried meat products. SD

Beef

642

All (MS) and Fung (DYC). **Occurrence of *Clostridium perfringens* in ground beef and ground turkey evaluated by three methods.** *Journal of Food Safety* 11(3): 1991: 197-203

643

Greer (GG) and Jones (SDM). **Effects of lactic acid and vacuum packaging on beef processed in a research abattoir.** *Canadian Institute of Food Science and Technology Journal* 24(3/4): 1991: 161-168

644

Taal (H-CS) and Slavik (MF). Rapid method for detection of *Salmonellae* attached to chicken skin. *Journal of Food Safety* 11(3): 1991; 205-214

A rapid, sensitive nitrocellulose membrane lifting technique was developed to identify *Salmonella typhimurium* attached to chicken skin. Basically, this method used a nitrocellulose membrane to remove salmonellae attached to chicken skin. The membrane with attached salmonellae was then incubated on xylase lysine deoxycholate (XLD) agar for 18 h at 37 C. Appearance of black colonies on the white membrane was considered a positive presumptive test for salmonellae. Immunostaining of colonies on the nitrocellulose membrane was then used to confirm presence or absence of salmonellae. This technique can be used to identify salmonellae contamination of chicken skin in less than 24 h and was shown to be more sensitive than presently used swabbing or washing techniques. AS

Quail

645

Prabhakara Reddy (K), Narahari (D) and Alfred Jayaprasad (I). Influence of sodium tripolyphosphate (STPP) treatment on fractionation of Japanese quail (*Coturnix coturnix* - Japonica) muscle proteins. *Journal of Food Science and Technology (India)* 29(1): 1992; 60-61

Ready-to-cook Japanese quail carcasses of either sex were dipped in 0, 3 and 6% STPP for 3 and 6 h and stored at 4 plus or minus 1 C for 0, 72 and 144 h or were frozen (-18 plus or minus 1 C) and stored for 30 and 60 days. STPP dip of Japanese quail carcasses significantly increased the water and salt soluble protein fractions and had no effect on changes in the non-protein nitrogen content. Different storage periods had also significantly influenced the water and salt soluble protein fractions, but not the non-protein-nitrogen content of the quail meat. Dipping of carcasses for 6 h in STPP solution increased the water soluble protein. AS

White leghorn cockerels

646

Pandey (NK) and Shyam Sunder (G). Carcass characteristics, meat yields and

physico-chemical properties of meat from white leghorn cockerels. *Indian Journal of Poultry Science* 25(4): 1990; 249-252

The carcass characteristics, meat yield and physical and chemical characteristics of meat of White Leghorn cockerels of 8, 10 and 12 wk of age were studied. Live wt. and dressed carcass wt. increased significantly with increasing age. The unit increase in live and dressed wt. was more between 8 and 10 wk than 10 and 12 wk of age. Dressing % was higher at 8 and 12 wk than at 10 wk of age. Blood loss during processing did not change with age whereas feather loss was significantly less at 12 wk of age. The yields of liver, gizzard and heart were higher at 10 wk and liver and gizzard yields remained constant thereafter till 12th wk. The yield of deboned meat, total meat and skin % was higher at 8 wk than at 10 or 12 wk. Age did not significantly influence the water holding capacity, protein, fat and ash contents. Sarcoplasmic and myofibrillar proteins, non-protein N and cooking loss and shear values of breast and leg muscles were significantly lower at 8 wk than at 10 or 12 wk of age. The overall performance, meat yield and quality characteristics were better at 8 wk which is the optimum slaughter age. SRA

SEAFOODS

647

Stammen (K), Gerdes (D) and Caporaso (F). Modified atmosphere packaging of seafood. *CRC Critical Reviews in Food Science and Nutrition* 29(5): 1990; 301-331

This review examines the safety of modified atm. packaging (MAP) of seafood through analysis and comparison of raw materials, research methodologies, quality indices, treatment and packaging options. Aspects covered include: the seafood spoilage, carbon dioxide and microbial inhibition, analytical methods (microbiological analysis, chemical and biochemical analysis, sensory analysis), *Clostridium botulinum*, comparison of methodologies (cod, rockfish and rock cod, salmon, finfish, swordfish, shrimp, herring and cooked seafood) adjunct treatments (potassium sorbate, irradiation, other treatments), ramification of MAP (residual effects, undesirable effects like odour and colour, texture, drip), packaging in modified atm. (bulk containers, master packs, individual MAP packages), and quality control. 14 references. SRA

Fish

648

Raghunath (MR) and McCurdy (AR). **Synthesis of plasteins from fish silage.** *Journal of the Science of Food and Agriculture* 54(4): 1991: 655-658

Fish silage, a hydrolysate from fish waste obtained by autolysis was investigated as a raw material for plastein synthesis. Optimum plastein synthesis from fish silage occurred between 65 and 70% degree of hydrolysis. Pepsin, papain and chymotrypsin synthesised plasteins from fish silage optimally at pH of 5.0, 6.7 and 8.0 resp. Plastein yield was highest when trichloroacetic acid was used as the precipitant. GS

649

Oehlenschlaeger (J). **Chemical composition of the flesh and other tissues of Antarctic fish species of the families Channichthyidae and Nototheniidae.** *Food Chemistry* 40(2): 1991: 159-167

The muscle, intestinal tract, stomach, spleen, heart, pyloric caeca, gonads and liver of 4 Antarctic fish species, *Notothenia neglecta*, *Notothenia gibberifrons*, *Chaenocephalus aceratus* and *Champsocephalus gunnari* were analysed for moisture, crude protein, carbohydrate, fat, ash, chloride and phosphorus. The chemical composition of the flesh of the fish showed that all 4 species are valuable food fishes with a high protein (17 - 19%) and a low to moderate fat content (0.8 - 1.9%). In all fishes investigated high amounts of trimethylamine oxide-nitrogen were present. Levels of trimethylamine-nitrogen were substantially higher (5 mg/100 g) and that of dimethylamine-nitrogen lower (0.05 mg/100 g) than in North Atlantic fish, while the ammonia-nitrogen content was comparable (10 mg/100 g). During distillation only nototheniids underwent deamination reactions leading to high TVB-N values. Ice-fishes were unaffected. *N. neglecta* and *N. gibberifrons* were found to store considerable amounts of carbohydrates and fat in their livers (4.6 and 8.2% carbohydrates and 16.3 and 14.4% fat, resp.). *Ch. gunnari* accumulates fat in intestinal tract, spleen and pyloric caeca. The stomachs of all fishes had high chloride levels. The livers of *Chaenocephalus aceratus* were heavily infested (up to 20 wt.%) by the parasitic nematode *Contracaecum* spec. AS

650

Kotb (AR), Abu Hadeed (AF) and Al-Baker (AA). **ω -3 polyunsaturated fatty acid content of some popular species of Arabian gulf fish.** *Food Chemistry* 40(2): 1991: 185-190

651

Simko (P). **Changes of benzo(a)pyrene contents in smoked fish during storage.** *Food Chemistry* 40(3): 1991: 293-300

Benzo(a)pyrene (BaP) was detn. by HPLC method. Separon SGX C-18 column, using selective fluorescence detection. BaP degradation in the model system was directly proportional to the duration of influence of environmental, physicochemical factors but in smoked fish the contents were changed according to the diffusion into the internal product layers showing that BaP cannot be constant but gradually decreases due to various factors influencing the degradation process. SD

652

Steiner-Asiedu (M), Julshamn (K) and Lie (O). **Effect of local processing methods (cooking, frying and smoking) on three fish species from Ghana. Part I. Proximate composition, fatty acids, minerals, trace elements and vitamins.** *Food Chemistry* 40(3): 1991: 309-321

Processing per se had no effect on the comp. of two marine (*Sardinella* sp., *Dentex* sp.) and a fresh water fish (*Tilapia* sp.). Smoking and cooking did not affect free fatty acid comp. of which was masked by palm-kernel oil in fried fish. The fish contained appreciable amounts of n-6 fatty acids, Na, Ca, P, Mg and trace elements (Fe, Cu, Zn and As). There were no thiamine (low in *Dentex* sp. only) due to thiaminase and low vitamins B₂ and B₆ in all the fish. SD

Pink perch

653

Vidyasagar Reddy (G), Srikar (LN), Kuntla (BK) and Senthilvel (A). **Lipid freshness parameters in relation to shelf-life of pink perch (*Nemipterus japonicus*) stored in ice.** *Indian Journal of Nutrition and Dietetics* 27(2): 1990: 53-58

This investigation was conducted to study the effect of storage in ice on the development of hydrolysed and oxidative products which affect the texture and flavour of fish due to their interaction with proteins. Pink perch was iced in an insulated fish container, and was held for 0 (fresh), 3, 5, 8, 11 and 14 days and the changes in chemical and organoleptic qualities were determined. During 14 days the lipid content decreased from 0.74 to 0.63% and salt soluble proteins also decreased significantly, but the peroxide value increased from 12.29 to 26.39 mm of O₂ per 1000 g lipid. The increase in thiobarbituric

but the free fatty acid (s oleic acid) increased from 3.73 to 13.31% of total lipids. Pink perch was rated acceptable upto 13 days in ice. GS

Salmon

654

Polvi (SM), Ackman (RG), Lall (SP) and Saunders (RL). **Stability of lipids and omega-3 fatty acids during frozen storage of Atlantic salmon.** *Journal of Food Processing Preservation* 15(3): 1991; 167-181

Very little loss of triglyceride and no selective change in triglyceride fatty acid comp. but an increase in lysophospholipids and in free fatty acids were noticed in salmon fillets stored at -12 C for 3 months. Certain degree of non random lipolysis of phospholipid occurred with selective enrichment of free fatty acids in omega-3 fatty acids. Formation of polar (oxidized) accompanied hydrolysis of the omega-3 fatty acids most of which remained nutritionally available after storage. SD

Sardines

655

Choorit (W), Sophanodora (P), Wuttijumnong (P), Pooldam (A) and Buckle (KA). **Quality of fish paste (kapi) from sardine.** *ASEAN Food Journal* 6(1): 1991; 28-31

The effect of delay in salting time (0, 1, 2 days), fish-salt ratio (2:1, 3:1, 4:1 W) and repetition of pasting (mincing) step (1, 2 times) on quality of fish paste (kapi) from sardine were studied using a 3³ factorial design. Samples were taken at 0, 10, 30 and 60 days for total volatile bases analysis of amino nitrogen and pH. Results indicated that delay in salting time and fish:salt ratio affected the quality of fish paste. The most acceptable product was prepared with a fish:salt ratio of 4:1 (w/w) with a delay in salting time of one day. The product contained 20% (dry basis) protein, 23% (dry basis) salt, 45% moisture, total volatile bases of 5.4 g/kg (dry basis), amino nitrogen content 23.2 g/kg (dry basis) and pH 7.0. SRA

Tuna

656

Przybylski (R), Eskin (NAM) and Malcolmson (LJ). **Development of a gas chromatographic system for trapping and analyzing volatiles from canned tuna.** *Canadian Institute of Food Science and Technology Journal* 24(3/4): 1991; 129-135

components were developed on chemical groups of decomposition and rancid off-odour. Recovery of over 80% of the volatile components from canned tuna was obtained with a coeff. of variation of 3.2%. The use of sodium sulphate as dehydrating agent resulted in poorer reproductivity and higher coeff. of variation of 6.9%. GS

Products

657

Yu (SY). **Effect of fish:flour ratio on fish crackers 'Keropok'.** *ASEAN Food Journal* 6(1): 1991; 36

This analytical study revealed that protein contents were increased with increasing fish content but the protein, moisture, fat and ash contents were largely unaffected. With the ratio of 2:1 of fish to flour (30.1% protein) there was a marked decrease in linear expansion which was directly related to the crispness, which was found to be the most important parameter governing the quality of 'Keropok'. At a protein content of 30%, the linear expansion of 103.4% was well within acceptable limits. However, samples with higher protein contents at a ratio of fish to flour greater than 2:1 were not acceptable. SRA

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

658

Sen (AK) and Bhattacharjya (S). **Quality norms for alcoholic drinks.** *ISI Bulletin* 4(10): 1991; 414-417

The Bureau of Indian Standards, New Delhi has formulated standards for alcoholic drinks considering such aspects as raw materials, alcoholic content, additives, sensory evaluation and packing. The authors feel that these standards need revision if these products are to compete with internationally reputed brands. SRA

Non-alcoholic beverages

Coffee

659

Berger (A), Brulhart (M) and Prodollet (J). **Detection of adulteration in pure soluble coffee by enzymatic sugar determination.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 59-62

Detection of adulteration in instant coffee with various carbohydrate-containing coffee substitutes can be easily achieved by an enzymatic detn. of fructose and glucose after controlled acid hydrolysis of the suspected sample. The procedure was applied to pure soluble coffees of different origins. Values of 0.8% for total fructose and 1.8% for total glucose have been derived as reasonable limits above which an instant coffee should be considered as adulterated. Analysis of deliberately adulterated instant coffees enabled lowest detectable levels to be determined for various ingredients. These levels lie around 1.5% for chicory, 2.5% for cereal products and 3.5% for caramel. The procedure can also be applied to the detection of low levels of other coffee substitutes such as figs, maltodextrins, glucose syrups, starch and unroasted coffee husks/parchment. The method is however not intended for identifying the type or determining the amount of adulterants. AS

660

Maler (HG). **Carcinogenic compound content in coffee beans.** *Cafe-Cocoa-The* 35(2): 1991: 133-142 (Fr)

A review of the publication of the last 25 yrs about the detn. of polycyclic aromatic hydrocarbons, nitrosamines and carcinogenic mycotoxins in coffee. 32 references. BV

Fruit juices

Apple juices

661

Principe (L) and Lozano (JE). **Reduction and control of non-enzymatic browning in clarified apple juice by absorption and ion exchange.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 34-38

This paper discusses the applications of activated carbon (AC) and ion exchangers for decolouration and control of non-enzymatic browning in clarified apple juice. Different ACs were assayed as brown-component absorbers. They were effective

for the decolouration of long-term stored apple juices with low amino acid content. The degree to which decolouration occurred and the resulting equilibrium relationship have been correlated according to the empirical isotherm of Freundlich. Apple juices were also treated with Amberlite IRA-958 and Dowex (50 x 8) resins which gave a product with acceptable physical, chemical and sensory characteristics. The partial reduction of amino compounds resulted in a proportional decrease of the non-enzymatic browning rate. Results also show that ion exchange-treated juices were more stable under hard storage conditions. AS

662

Jenniskens (LHD), Voragen (AGJ), Pilnik (W) and Posthumus (MA). **Effects of the treatment of apple pulp with liquefying enzymes on the aroma of apple juice.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 86-92

The effects of apple pulp treatments with liquefying enzymes on the aroma comp. of apple juice was studied with capillary GC. Conventionally produced apple juice was compared with apple juices produced by enzyme treatment, and with control juices, i.e. juices produced by pressing after pulp incubation without liquefying enzymes. It was found that the effects could be divided in an incubation effect, which was caused by prolonged action of the endogenous enzymes, and in a specific liquefaction effect which caused an extra release of aroma components or precursors of aroma components from the pulp particles into the juice. Furthermore the presence of esterase and C6-aldehyde forming side activities in the liquefying enzyme preparation was demonstrated. AS

Grape juices

663

Vasundhara (TS), Phanindra Kumar (HS) and Jayathilakan (K). **Effect of relative concentration of different sugars on the freeze-drying properties of grape juice.** *Journal of Food Science and Technology (India)* 29(1): 1992: 45-47

The juice from blue grapes varied considerably in its total sugar content during a 2 yr period from 8 to 19° Brix in which the reducing sugar amounted to 85 - 90%. When made up as 20° Brix juice, these samples exhibited various problems during freeze-dehydration. When the sucrose to glucose ratio was equal or lower than 1.0:0.47 or sucrose to fructose ratio was equal or lower than 1.0:0.27; the juice could be satisfactorily freeze-dried and stored without exhibiting hygroscopicity for several months. With higher initial Brix, of greater than 8° these values were much higher and led to drying

problems. Method adopted for preparing juice for freeze-drying when the ratio were altered to increase the total non-reducing portion by incorporating cane sugar to a level of 30, 35 and 40° Brix, the same juice samples dried satisfactorily. The ratio of the total reducing sugar to sucrose rather than the ratio of glucose or fructose to sucrose individually was found to be more important in determining the freeze-dried characteristics of grape juice. AS

664

Malletroit (V), Guinard (J), Kunkee (RE) and Lewis (MJ). **Effect of pasteurization on microbiological and sensory quality of white grape juice and wine.** *Journal of Food Processing Preservation* 15(1); 1991; 19-29

Heat treatment, of less than 3 Pasteurization Units (PUs) reduced 10^6 cells/mL of *Saccharomyces cerevisiae* and *Hansenula anomala* added to chenin blanc juice to an undetectable level, 10^5 PUs resulted measurable browning in juice and upto 50,000 PUs did not significantly affect flavour as determined by a trained panel. Pasteurized (23 PUs) and nonpasteurized juice fermented at the same rate. Tunnel pasteurization (13.7 PUs) reduced 5×10^6 yeast cells/mL added to grape juice to an undetectable level without affecting juice or wine flavour. SD

Orange juices

665

Watanabe (H), Hagura (Y), Ishikawa (M), Mihori (T) and Sakai (Y). **Elastic modulus of orange juice ice.** *Journal of Food Process Engineering* 14(1); 1991; 1-8

The elastic modulus of orange juice ice as well as pure water ice was measured at temp. between -10 and -196 C by compression tests. The elastic modulus of pure water ice was almost constant in the whole range of the tested temp.: 5.6×10^9 N/m² at -196 C and 4.0×10^9 N/m² at -10 C. In contrast, the elastic modulus of orange juice ice changed greatly with temp.: 11×10^9 N/m² at -196 C and 0.2×10^9 N/m² at -10 C. Orange juice ice was considered to consist of pure water ice particles which are dispersed in a matrix of concentrated amorphous solution (CAS). The elastic modulus of CAS was calculated using an equation for a disperse system. AS

Pineapple juice powder

666

Phanindra Kumar (HS), Jayathilakan (K) and Vasundhara (TS). **Factors affecting the quality of freeze-dried pineapple juice powder.** *Indian Food Packer* 45(2); 1991; 5-11

Pilot scale production of freeze-dried juice powder was tried with 'Gaint Kew', 'Queen' and Mixed (Mauritius) var. of pineapple. 'Gaint Kew' var. with a min. Brix of 12°, acidity around 1.0% and with a min. of 120 µg total carotenoids/100 g juice gain an acceptable quality product. Other var. were unsuitable for freeze-dried juice powder preparation. Addition of citric acid prior to pasteurization was detrimental to the quality of the freeze-dried powder. Pulverisation of juice powder with sugar increased the *a_w* of the product and protected against minor changes in moisture and temp. which were important in the quality and stability of the product. VKR

Tangerine juices

667

Chamchong (M) and Noomhorm (A). **Effect of pH and enzymatic treatment on microfiltration and ultrafiltration of tangerine juice.** *Journal of Food Process Engineering* 14(1); 1991; 21-34

Tangerine (*Citrus reticulata* blanco) juice clarification by crossflow microfiltration and ultrafiltration using polysulphone flat sheet membranes with nominal mol. wt. cut off of 25,000, 50,000, 100,000 and 0.1 µm, 0.2 µm pore sizes was studied. The juice was pretreated by polygalacturanase and pH adjustment. The treated juice was clarified with a lab. scale filtration unit with effective filtration area of 14 cm². Filtration conditions were transmembrane pressure of 93 to 194 kPa, crossflow velocity of 0.96 to 3.5 m/s and 25 C. Membrane performance was evaluated in terms of volume flux and clarity (% transmittance) of the permeate. Pretreatment of the juice by polygalacturanase and adjustment to pH 2 with HCl resulted in a clearer supernatant than enzyme treatment alone. Max. flux was obtained with the 0.1 µm microfiltration membrane. Flux increased with transmembrane pressure and crossflow velocity. Flux at 194 kPa and 3.5 m/s was 69 L per square meter per h. Permeate clarity was better at higher transmembrane pressure and lower velocity, due to the effect of the polarized/fouling layer of solute on the membrane surface, which acted as a secondary "dynamic" filter. AS

FATS AND OILS

Oil

Palm oil

668

Jideani (VAE). **Carotene retention in palm oil by mechanised and traditional processes.** *Journal of Food Science and Technology (India)* 29(1): 1992: 68-69

Samples collected at various stages during mechanised and traditional palm oil production processes were cold saponified. The rate of β -carotene destruction was more in mechanical process. Hence, palm oil by traditional process retained about three times more carotene than that processed mechanically. The thermal destruction rate of carotene doubled for every 20 C rise in processing temp. AS

669

Manorama (R) and Rukmini (C). **Sensory evaluation of foods prepared in crude palm oil.** *Journal of Food Science and Technology (India)* 29(1): 1992: 70-72

Crude palm oil (CPO) produced in India has been evaluated for its nutritional quality and safe edibility. As it is one of the richest natural sources of β -carotene, it is an ideal vehicle for vitamin A supplementation programmes to pre-school and school children. Hence, foods prepared in CPO were evaluated for quality by a selected panel of judges. Mean scores by 15 judges for different quality attributes indicated that CPO was found suitable in the preparations of *suji halwa* and *muruku*. Although it is known that continuous deep-fat frying for long periods results in destruction of β -carotene due to oxidative degradation, the first fried product *muruku* was found to have high β -carotene retention, and in this product, CPO was also found to be highly suitable by the panel. Preparations made in a 1:1 blend of refined groundnut oil and CPO also showed good quality. AS

Rice bran oils

670

Sivala (K), Vasudeva Rao (V), Sarangi (S), Mukherjee (RK) and Bhole (NG). **Mathematical modelling of rice bran oil expression.** *Journal of Food Process Engineering* 14(1): 1991: 51-68

The expression of liquid from a solid-liquid matrix of oil-bearing material is a complex process and is incompletely understood. An investigation was taken up to understand the phenomena relating to compression and consolidation of rice bran and gain an insight into flow behaviour of oil under uniaxial compression. A mathematical model based on one-dimensional consolidation theory (Terzaghi 1943) was developed with suitable assumptions, taking into account the test-cell geometry. The experiments were conducted with two types of parboiled rice bran; original unsieved bran and bran sieved through B.S. 30 mesh. The developed model was tested and a close agreement was found between calculated and observed values. AS

SPICES AND CONDIMENTS

Spices

Garlic

671

Mirhadi (SA) and Sundarshan Singh. **Effect of garlic supplementation to cholesterol-rich diet on development of atherosclerosis in rabbits.** *Indian Journal of Experimental Biology* 29(2): 1991: 162-168

Male albino rabbits (25) of about 2 months age were fed for 150 days with garlic at 1 g/kg body wt. along with a basal diet consisting of green lucerne, water soaked green gram and cholesterol. Inclusion of garlic in cholesterol-rich diet retarded the development of atherosclerosis by (i) decreased uptake of cholesterol by aorta through decreased concn. of plasma cholesterol, (ii) increased mobilisation of cholesterol and other lipids and their decreased biosynthesis in the aorta, (iii) increased excretion of bile acids through faeces and (iv) increased plasma fibrinolytic activity. Inclusion of garlic in the atherogenic diet also decreased the total lipids and cholesterol accumulation in the liver. SRA

SENSORY EVALUATION

672

Vickers (Z). **Sound perception and food quality.** *Journal of Food Quality* 14(1): 1991: 87-96

Auditory attributes such as crispness and crunchiness contribute to food quality adding complexity and interest to consumer. Factors like briskness in carbonated beverage are desirable and grittiness with sound is food undesirable. SD

673

Civille (GV). **Food quality: Consumer acceptance and sensory attributes.** *Journal of Food Quality* 14(1): 1991; 1-8

The measurement of food quality includes the detn. of key attributes and measurement of conformance to them. Both descriptive analysis documenting products and consumer input measuring effective responses define sensory quality. Since descriptive quality specification and consumer response to key attributes are related and the management can use the same for quality control. SD

674

O'Mahony (M). **Taste perception, food quality and consumer acceptance.** *Journal of Food Quality* 14(1): 1991; 9-31

Aspects covered include: quality and consumer acceptance, taste and other senses, elimination of cross-sensory interference for sensory testing, basic tastes, primary tastes and descriptive analysis and the brain and information overload. SD

675

Lawless (H). **The sense of smell in food quality and sensory evaluation.** *Journal of Food Quality* 14(1): 1991; 33-60

Covers definition of quality, the role of olfaction in sensory quality (retronasal smell and flavour, quality and product defects, modeling acceptance) and concerns in the evaluation of aroma and flavour (instrumental-sensory relations, individual differences in odour responsiveness, context effects, the challenge of terminology development and quality in sensory testing). SD

676

Clydesdale (FM). **Colour perception and food quality.** *Journal of Food Quality* 14(1): 1991; 61-74

This paper briefly reviews some of the relationships between colour, acceptability and food intake which are obviously critical to food quality. It also discusses a generalized model of colour measurement, and describes a few specific examples of how this model might be utilized as a potential predictor of quality parameters. 27 references. SD

677

Szczesniak (AS). **Textural perceptions and food quality.** *Journal of Food Quality* 14(1): 1991; 75-85

Assessment in scoring systems, texture as a general concept (definition, and classification of textural characteristics) importance to consumer, connotation of specific textural characteristics, and texture perception are the aspects reviewed in this article. 20 references. SD

678

Teranishi (R), Buttery (RG), Stern (DJ) and Takeoka (G). **Use of odour thresholds in aroma research.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991; 1-5

The concept of odour threshold is useful in : 1. defining odour purity, 2. estimating the necessary amount of starting material, 3. serving as a reference point in describing intensity and odour quality, and 4. evaluating which of the components present are important in contributing to a characteristic aroma. A graphic representation of the concn. of components present and contribution of each constituent can now be presented as an 'aromagram'. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

679

Vijaya Bhanu (N), Geeta Ramachandra and Vincent Monteiro (P). **Evaluation of protein isolate from *Cassia uniflora* as a source of plant protein.** *Journal of the Science of Food and Agriculture* 54(4): 1991; 659-662

Cassia uniflora Mill (*Cassia sericea* Sw) was analysed for its proximate composition and amino acid profile of a protein isolate prepared from it. The isolate contained 725 g Kg⁻¹ protein, was rich in lysine and less sulphur and aromatic amino acids and leucine. Antinutritional factors like phytates and phyto haemagglutinin (PHA) were not to be found. Polyphenols were moderately high whereas trypsin and chymotrypsin were very high. However the protein isolate had a high (93.6%) *in vitro* protein digestibility. GS

680

Barthakur (NN) and Arnold (NP). **Nutritive value of the chebulic myrobalan (*Terminalia chebula* Retz.) and its potential as a food source.** *Food Chemistry* 40(2): 1991; 213-219

Chebolic myrobalan edible fruit tissue contained 10.3 and 14.5 times more vitamin C than commercial apples and the fruit could be a source of dietary supplement in vitamin C, energy, protein and mineral nutrients. The min. recommended dietary allowance for Se, K, Mn, Fe and Cu can be met (100, 63.5, 32, 30 and 28.5% resp.) if 100 g of the raw fruit is eaten. Aspartic acid, glutamic acid, arginine, proline and lysine constituted 39.6, 8.6, 6.7, 6.4 and 5.0% resp. of the total amino acids. SD

BIOCHEMISTRY AND NUTRITION

681
Dally (S), Armfield (SJ), Haggett (BGD) and Downs (MEA). **Automated enzyme packed-bed system for the determination of vitamin C in foodstuffs.** *Analyst (London)* 110(8): 1991: 569-572

A microprocessor controlled flow injection system is described for the detn. of vitamin C in foodstuffs. The system is based on amperometric detection at a wall-jet electrode coupled with an ascorbate oxidase packed bed. A commercially available Cartesian

robotic auto-sampler-dilutor is used as a means of fully automating the sample handling and dilution. Dithiothreitol (DTT) is used to reduce dehydroascorbic acid to ascorbic acid and to stabilize ascorbic acid standard solutions. Initially, the system was connected in series with a HPLC column and UV detector to allow identification of possible interferents and to allow comparative evaluation of results. The system showed a linear response to the concn. of L-ascorbic acid in the range 1-200 $\mu\text{g ml}^{-1}$ and was capable of detecting total vitamin C in a range of foodstuffs at a sample throughput of 15 samples h^{-1} . Correlations to existing methods of 0.98 were obtained. AS

TOXICOLOGY

Nil

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